PAPER TRADE JOURNAL

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Nekoosa - Edwards Co. Plans Improvements

Capacity of Bleaching Plant at Nekoosa, Wis., Mill to be Increased Shortly by Adding Five-Ton Chlorinator—Port Edwards Mill Bleaching Plant Also Being Enlarged by Addition of Two Five-Ton Low Density Bleachers

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., May 4, 1936—Needed equipment for its expanding demand for the new lines of fine papers is being installed by the Nekoosa-Edwards Paper Company. The capacity of its bleaching plant at the mill at Nekoosa, Wis., is being increased by adding a five-ton chlorinator. It is 17 feet in diameter and 26 feet high, and will be located north of the present bleaching plant.

The bleaching plant at the Port Edwards, Wis., mill is also being enlarged by the addition of two five-ton low density bleachers, to be located east of the present plant.

Grandfather Falls

Negotiations are being completed by the Grandfather Falls Paper Company, Merrill, Wis., to sell its upper Grandfather Falls water power property to the Wisconsin Public Service Corporation, the utility serving the Wisconsin River Valley. Permission is being sought from the Wisconsin Public Service Commission to consummate the deal, which is reported to involve a $400,000 consideration. The paper company intends to retain ownership of its transmission line by which the power has been transmitted fourteen miles from the dam to the mill, but hereafter will be supplied power under a contract with the utility company. The mill has several wood grinders operated by water wheels, but its paper machine and other equipment are electrically operated.

Modernization of the Grandfather Falls power plant and extensive repairs are contemplated by the Wisconsin Public Service Corporation. Immediate expenditures will be made approximating $100,000 to $150,000.

The Grandfather Falls Paper Company at one time owned two power dams, and the one known as the lower dam at the Prairie River dalles was also sold several years ago to the Wisconsin Public Service Corporation. The two dams have a combined fall of more than 100 feet.

Ground Wood Mill Being Dismantled

Dismantling has been started of the ground wood pulp mill at Merrill, Wis., of the former Ewing-Everest Pulp Company. The machinery is being salvaged, but the building will be razed with the exception of the grinder room.

The plant was originally built in 1904 by the Lindauer Pulp and Manufacturing Company. The mill was sold with its water power rights to the Wisconsin Valley Electric Company in 1915. The Ewing-Everest Pulp Company was formed the following year by D. C. Everest, vice-president and general manager of the Marathon Paper Mills Company, and M. C. and George Ewing, with the latter as manager. In 1932 it was leased to the Marathon company but after a year of operation was closed down permanently.

New Kimberly-Clark Officers

Officers were elected by the board of directors of the Kimberly-Clark Corporation, Neenah, Wis., at a meeting April 28, as follows: President, F. J. Sensenbrenner; executive vice-president, Ernst Mahler; vice-presidents, J. S. Sensenbrenner, S. F. Shattuck and Charles H. Sage; secretary and treasurer, C. A. Sommers; assistant secretary, F. E. Sensenbrenner.

An enviable compliment was paid to the Kimberly-Clark Corporation by Arthur Pound in his book, "Industrial America," published recently. Out of twelve outstanding corporations chosen for his study, he selected Kimberly-Clark as representative of the paper industry, terming the company "a shining example of the power of new products and steady advertising in overcoming generally adverse conditions."

Mr. Pound also says: "Under the leadership of F. J. Sensenbrenner, who joined Kimberly-Clark in 1889 and became the president in 1926, the company developed policies which were far ahead of their time and have influenced the entire paper making industry.

"In the reach of its research, engineering, industrial relations, advertising and sales promotion activities, it is as alert and progressive as any business unit in the country, regardless of size or reputation."

Executives to Inspect Paper Chemistry Institute

Principal executives of the member firms of the Institute of Paper Chemistry, Appleton, Wis., will gather at Appleton June 5 and 6 to attend its first executive conference and make a thorough inspection of the Institute buildings. The extensive additions to the buildings are expected to be completed by that time. After going over the

(Continued on page 26)

Price Bros. Reorganization Plan Defeated

Saguenay Power Co., Subsidiary of Aluminum Co., and Second Largest Individual Creditor, Defeats Proposal Sponsored by Company Itself—Pacona, Ltd., May Make Another Attempt to Rehabilitate Big Newsprint Company

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., May 4, 1936—Defeat has met an attempt to reorganize Price Bros. & Co., newsprint firm operating in bankruptcy, the Saguenay Power Company, second largest individual creditor and a subsidiary of the Aluminum Company, having voted against a plan sponsored by Price Bros. & Co., itself. A new plan is forthcoming, it is stated.

Both preferred and common shareholders at a special meeting gave unanimous consent to the plan submitted, but it was defeated by the Saguenay Power Company (formerly Duke-Price Power Company). Saguenay Power is controlled by Aluminum Company interests, which, through another, recently formed, subsidiary, Pacona Ltd., now owns or controls the bulk of Price Bros. first mortgage bonds outstanding. It was indicated at the meeting in Quebec this week by representatives of Pacona and the Aluminum Company, that the former was prepared to submit a plan of reorganization whenever the way was cleared for doing so.

The plan which was up for approval called for provision of $7,500,000 new capital by way of second mortgage debentures convertible into common stock. The new capital would pay arrears of bond interest and pay unsecured creditors in cash.

Preferred shareholders would retain their shares at full value and receive in compensation for waiving dividend arrears two and one-half new common shares for each share of preferred. Common shareholders would receive three new common in exchange for four old.

Pacona, Ltd., recently made an offer of $20,000,000 for the assets of the company without making provision for the preferred and common shareholders.

A statement by R. E. Powell, of the Saguenay Power Company, indicated the grounds for opposing the plan submitted in Quebec today, and suggested that an alternative plan is in preparation by Pacona Ltd. Mr. Powell's statement reads as follows:

"As we interpret the scheme of arrangement of March 18 it does not guarantee payment in full of all the claims of the creditors. The scheme provides for $7,500,000 of new money, but it is believed that all or practically all of that large sum will be required to pay commitments leaving little or nothing for bank loans now amounting to $3,733,000.

"Months before judicial recognition of the bankruptcy, Price Bros. & Co. Ltd., found itself unable to pay bond interest of $663,696 per year. The scheme would increase interest charges to $1,113,696 per year.

"To pay fixed charges and preferred dividends as provided by the scheme, the reorganized company would require earnings each year of slightly over $3,000,000 before anything would be available for common stock. The last time such earnings were available newsprint was selling at $57 per ton in New York.

"John Stadler, noted consulting engineer, and other parties, agree that newsprint at more than $45 per ton would encourage the development of newsprint manufacture in the southern part of the United States, which would be harmful to the reorganized company and to other Canadian newsprint manufacturers, as well as to the Saguenay Power Company and Pacona Ltd., and the Canadian Public in general.

Premier Taschereau Discusses Newsprint

The papers here gave considerable prominence to the news that American publishers were advising a boycott of Canadian newsprint mills as a protest against combinations between the provincial governments and the industry with a view to raising the price of newsprint. The Hon. L. A. Taschereau, premier of Quebec Province, in a statement on the subject in Montreal said: "I see in the newspapers an item,—and I hope my words will reach an equal distance—that the Americans are greatly worried about an agreement between Quebec and Ontario in regard to paper, and that they have decided to buy as much paper as possible in the United States so as to defeat the Ontario-Quebec agreement.

"If there is such an agreement, I am glad of it. It is long overdue. But I can say to our American friends, who are business men, that there is no agreement whatever between Ontario and Quebec to take advantage of the situation and hoist the price of paper beyond what is just and reasonable. However, there is one thing that we must do, and that is see that paper, which is our greatest industry, is sold at a price which will at least enable our manufacturers to live.

"If there is an agreement between us that brings that result, we do not want to oppress our friends on the other side, but if that result is achieved neither Ontario nor Quebec will have wasted their time. We shall have done just what any other men directing the destinies of a province would wish to do."

English View on Newsprint Prices

Referring to the newsprint situation in Canada and the United States, John Cowley, chairman of the *London Daily Mirror*, and president of the Anglo-Canadian Pulp and Paper Mills, Ltd., says:—"The price to the publishers last year had drifted downwards to such a figure that it was impossible for but very few newsprint manufacturers in Canada to earn sufficient to cover debenture interest, let alone pay any kind of dividend on preference and common shares.

"A slight, but very slight, turn for the better took place at the beginning of this year when it was agreed to hoist the price of newsprint per ton by one dollar. This, it is felt, is just the beginning of a gradual improvement in price, which, we expect, will in due course tend to a definite recovery in the newsprint industry, leading eventually to sufficient profits being earned to pay something on the preferred and common stocks of the various companies over there.

"Many American publishers are relying upon the low price and the present plentiful supply of newsprint paper, but as time goes on and the general recovery in the United States continues, it is anticipated that many publishers who have not protected themselves are likely to be faced not only with difficulty in securing their requirements, but also with the prospect of paying a much higher figure than they would have been called upon to pay had they looked ahead and made definite arrangements for their supplies at a fair price to the manufacturers."

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South Walpole, Massachusetts

YOU CAN MAKE MORE MONEY WITH NEW BIRD MACHINERY

Chicago Paper Industry Fundamentally Strong

Local Paper Market Approaching Normal Season Let-Down Without Any Disconcerting Factors—Kraft Wrapping Paper Continues Steady to Firm—Sulphite Bonds Still In Persistent Request—Paper Stock Comparatively Dull

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., May 4, 1936—While the Chicago paper market seems to be fundamentally strong, there is every indication that May will not prove the sensation provided by the same month of last year. On the contrary, the market is approaching its normal seasonal let-down without, however, any disconcerting factors reported by local commentators. Virtually every line gave no evidence of any weak spots with krafts continuing strong and with sulphites providing a favorable showing. There is local comment concerning further strength of the unbleached sulphite markets. Bonds, in general, were in fair demand, while books and covers showed little change during the past week. Ledgers and writings were not as active as in the preceding week, a more or less natural seasonal development. Ground woods were continuing in fair demand while the situation with respect to newsprint was taken locally as more encouraging. Waste papers were comparatively dull with kraft stocks showing easily the best position. Mixed and folded news were unchanged while corrugated waste was reported as perhaps the least in demand.

Association Activities

The coming week finds Chicago executives entertaining at least two important divisions of association activity. The Sulphite Bond group of the Writing Paper Manufacturers Association, meets at the Drake Hotel on the afternoon of Wednesday, May 6, for a general discussion, while the Executive Committee of the same association will meet the evening of May 5 for a preliminary conference. Arrangements are being made by Emmett Naylor, secretary. The Book Paper Manufacturers are to hold a general meeting at the Drake Hotel on the morning of May 7.

The Salesmen's Association of the Paper Industry, Midwest Division, held an unusually interesting meeting on Monday, April 27, devoting virtually the entire time to a round table discussion of conditions in general. Reports were optimistic although evidence of a seasonal let-down was obvious. The Midwest Division is set to pry open the annual golf outing season on May 22 when the salesmen and guests will journey to the Park Ridge Country Club to spend the day in the usual fashion.

News of the Industry

Shippers will be interested to know that the fleet of five Chicago Tribune vessels carrying newsprint to the local market, this week cleared the ice jam which had closed the eastern end of Lake Erie to shipping for several days. There were twenty-two other vessels in the vicinity, held in the blockading ice, and most of these also were breaking clear during the latter part of the week of April 27.

Crane Company, suppliers to the paper trade, announces the establishment of a new department of employee relations headed by A. E. Holstedt, who is resigning his position as chief of industrial relations and personnel of Wilson & Co., to join the Crane organization. Prior to this connection, Mr. Holstedt spent many years with the Western Electric Company, his thirty years of experience having been almost equally divided between general manufacturing and engineering duties and the supervision of employee relations. The purpose of the new department is to more effectively carry out the traditional Crane policy of fairness to employees and to provide for each employee the opportunity for the best utilization of his or her ability on the basis of merit.

It is reported that eastern trunk and Central Freight Association lines have approved applying a 20½ cent rate on imported and intercoastal woodpulp moving from Baltimore and Hampton Roads to points in southern Michigan. The Chicago Journal of Commerce points out that this rate has been published to become effective May 16. It adds that it was intended to apply for sixth section permission to enable making the rate effective at an earlier date but it is learned that the Container Corporation of America has given notice that it will move for the suspension of the 20½ cent rate to Michigan points. The abandonment of the plan to obtain sixth section permission resulted. The Southern Ports committee has filed a proposal for a 23 cent rate on wood pulp from gulf ports to a number of Indiana cities, the present rate being 24 cents except Lafayette which takes a different rate.

Link-Belt Company earnings for the first quarter showed a 50 per cent. gain over the same period in 1935 and the largest for the period since 1930. For the period ending March 31 Link Belt reported consolidated net income of $307,133, equal after preferred dividends to 37 cents a share on the 673,653 shares of common stock outstanding.

The Illinois Press Association held its semi-annual meeting at the Hotel Abraham Lincoln, Springfield, on April 24 and 25. On the two day program was a discussion "Fitting the Envelope to the Job," a movie presentation prepared by the Western States Envelope Company; and a discussion of photo-offset printing by C. L. Allen, assistant managing director of the National Editorial Association.

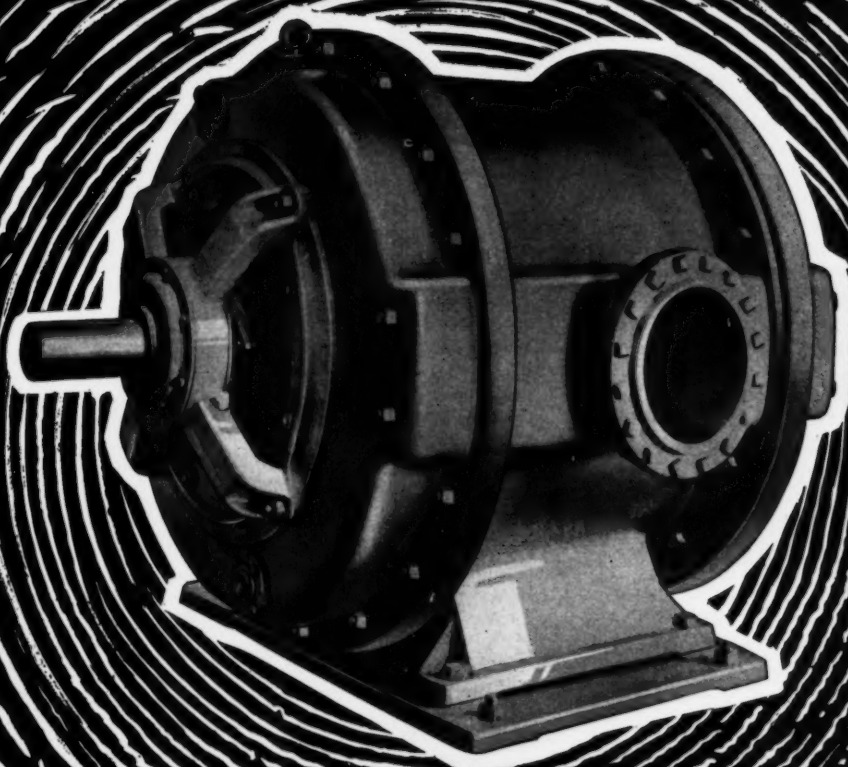
One of the feature events at the twenty-first annual convention of the Illinois Booksellers and Stationers Association is to be the presentation of a moving picture "The Making of Paper," by Herb Walsh, of the Southworth Paper Company. The convention bulletin announcing the May 4 and 5 meeting says "Mr. Walsh will bring this instructive film to Belleville because of the need on our part for knowing more concerning the making of paper. Considering how much paper we all sell and how little we all actually know of its manufacture, we believe you will welcome an opportunity to learn something of this important phase of our business." Exhibitors at the Belleville meeting include the Southworth Paper Company; Eaton Paper Company; the Graham Paper Company and the Quality Park Envelope Company. C. P. Garvin, general manager of the National Stationers Association, is also on the program.

R. H. Bursch Leaves Robert Gair Co.

R. H. Bursch announces his resignation as vice-president of Robert Gair Company, Inc., effective April 30.

Mr. Bursch plans to sail for a vacation in Europe early in May and will not announce his future plans until after his return.

Centralized Paper Mill Economy



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THE NASH ENGINEERING COMPANY
SOUTH NORWALK, CONNECTICUT, U. S. A.

Ontario Denies Attempt to Fix Newsprint Price

Answering Threat of U. S. Boycott, Premier Hepburn Declares Provincial Government Is Vitally Interested In The Plight of Manufacturers Struggling With Less Than Cost Quotations—Dominion Industry In Receivership

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., May 4, 1936—While Ontario pulp and paper concerns are struggling with less-than-cost prices for their products, the Ontario Government is vitally interested in their plight, but it is not trying to hold the newsprint prices above a fair market price, Premier Hepburn said this week. The Premier's statement was made when he was acquainted with the appeal made to American publishers to buy American and European newsprint and escape threatened price control on the Canadian market. Minister of Lands and Forests Peter Heenan took a stand along the same lines as the Premier.

"There is no attempt by the Province of Ontario to fix prices," he said. "But from my own knowledge of American publishers, they do not want their product produced under slave wages or slave conditions."

"All our pulp and paper industries are selling at a price that is less than cost," said the Premier in answer to a threat of a United States boycott. "Practically all the newsprint manufacturing industries—if not all— are in the hands of receivers because of the low price that prevails.

"As far as this Government is concerned we realize any reduction in price will mean a corresponding reduction in wages and possible inability of the newsprint mills to pay dues to the Government. So we are vitally interested. We are not endeavoring to hold down the price of newsprint above a fair market price."

The Minister of Lands and Forests did not believe that the New York hint that a price-fixed Canadian market should be avoided, really expressed the opinion of American publishers. "There is no attempt by the Province of Ontario to fix prices," Mr. Heenan said. "While I can't speak for the Province of Quebec, I know there is no thought in their minds down there of doing the same. From my knowledge of American publishers, I know those publishers are willing to pay a fair price for their newsprint, so as to enable the newsprint men to make a little money and to pay the men in the bush and in their plants. I'm surprised if anyone who says otherwise is speaking for the real newspaper publishers of America."

No Official Action Taken

In the meantime, according to word from Ottawa, no official comment is forthcoming from the Federal Government on the report from New York that members of the American Newspaper Publishers' Association had been warned against a coalition of the Canadian Government and Canadian paper manufacturers. A year ago there was a suggestion that the Federal Government would be asked to use the powers given it under "peace, order and good" government legislation to force Canadian pulp and paper manufacturers to maintain at a level that would enable those engaged in the industry to receive reasonable returns for their efforts. Previously the Governments of Ontario and Quebec had discussed the possibilities of obtaining agreement among the manufacturers to keep the price above a certain level, and failing that, considered asking the Dominion Government to act. Several of the manufacturers were in agreement on a minimum price, but it was not accepted by all and there was considerable agitation but no Government action was taken.

Abitibi Plant to Start Soon

"There is no doubt in my mind but that the Fort William plant of the Abitibi Power and Paper Company will be in operation shortly," announced Joseph E. Crawford, M. L. A., on his arrival home in Fort William from Toronto. "Negotiations for the revival of operations in the old company's plants under new control are proceeding very satisfactorily," he said, "and the patience of Fort William was bound to be rewarded soon. In a situation that requires time for development the scheme is moving just as quickly as the negotiators can make it," he declared. "The Great Lakes mill is operating at 90 per cent and I am convinced production will continue at this rate and perhaps be stepped up to a full 100 per cent in the not distant future," he added. Mr. Crawford said that larger woods operations than obtained last year are in prospect this summer in peeled pulpwood cutting. The winter cut this year has been one of the largest and the Government's impetus to the industry had received wholesale commendation from big operators to small individual settlers.

Boston Paper Industry News

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., May 4, 1936—The Dill & Collins Company, Philadelphia, is to have at the Hotel Statler an exhibition of photography comprising more than 150 prints of leading photographers. Combined with this exhibit will be a showing of 425 pieces of printed advertising. The exhibition will be held today from noon to 9 p. m. and Tuesday, May 5, from 11 a. m. to 5 p. m.

A sales meeting was held at the office of Carter, Rice & Co. Corp., Saturday morning, with a presentation from the Oxford Paper Company, Rumford, Me., of plans for the balance of 1936 and a general discussion of the various Oxford book grades. Wilson D. Rogers made the presentation.

A luncheon meeting of the Wrapping Paper Division of the New England Paper Merchants Association was held at the Boston Chamber of Commerce Friday. The Fine Paper Division will hold a meeting there Tuesday, May 5.

The annual outing of the New England Paper Merchants Association is to take place at Worcester, Mass., May 19.

Miss Anna G. O'Brien, of the office staff of Baird & Bartlett Company, box board dealers, has returned from a short trip to Washington, where she saw the cherry blossoms.

To Make and Sell Monarch Ball Metal

The Gardiner Metal Company, 4820 South Campbell avenue, Chicago, has taken over the sole manufacture and selling rights of Monarch ball metals formerly made by the Monarch Metal Company.

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Wherever the subject of liquid chlorine comes up for executive discussion, Diamond Liquid Chlorine is the logical choice. Made to Diamond's exacting manufacturing requirements for quality and uniformity and full strength, —this important bleaching agent is a recognized standard of purity everywhere.

DIAMOND ALKALI COMPANY
PITTSBURGH *and Everywhere*

Patent Decision Favors Jessup & Moore Co.

Joseph E. Plumstead, An Officer of the Company, Awarded Priority of Invention by United States Patent Office, On Method of Puffing Pulp, Formation Into Absorbent Paper and Recovery of Caustic Alkali Used Therein

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., May 4, 1936—A decision of great interest to the paper industry has just been handed down by the U. S. Patent Office, in favor of the Jessup & Moore Paper Company. The case involves Frank H. McCormick and George L. Schwartz, of E. I. duPont deNemours & Co., Wilmington; and Joseph E. Plumstead, an officer of the Jessup & Moore Paper Company, Philadelphia. The decision reads in part as follows:

"The invention in issue relates to the method of puffing pulp, the formation thereof into a absorbent paper and the recovery and reuse of the caustic alkali therein used, all of which is set forth fully in the seventeen counts in issue.

"Counts 1-15 of the issue are the claims of the patent 1,830,131 of the senior party Plumstead which was issued November 3, 1931. The Plumstead application which resulted in the above patent was filed May 9, 1929 whereas the application of the junior party McCormick and Schwartz was not filed until April 30, 1932. The application of the junior party was not filed until after the Plumstead patent had been issued, therefore as to counts 1 to 15, inclusive, which are claims of the issued patent, the junior party has the burden of proving priority beyond a reasonable doubt.

"Counts 16 and 17 are claims of the Plumstead reissue application 662,365, filed March 23, 1933, which was filed to reissue his patent herein involved. The subject matter of these counts is based upon Plumstead's original patent and therefore as to those counts it is thought that the junior party likewise should have the burden of proving priority beyond a reasonable doubt."

After considerable testimony on both sides together with numerous exhibits, the Examiner of Interferences in handing down this decision, further states:

"Accordingly it is held that McCormick and Schwartz have failed to establish in accordance with their burden a conception or reduction to practice of the invention of the counts in issue prior to the admitted meeting of the parties in the early part of December, 1928.

"The evidence produced on behalf of the senior party Plumstead to establish priority of invention is based upon oral testimony.

Important Issue of Case

"The important issue of this case is one of originality and as is usual in such cases there is much conflicting testimony.

"It will thus be seen from the testimony relative to derivation of the invention in issue that McCormick and Schwartz contend that they disclosed the invention in issue to the senior party Plumstead through a sketch similar to that of exhibit 11 as well as by oral and written descriptions thereof. Plumstead on the other hand admits that McCormick and Schwartz did disclose a meagre description of puffing pulp by treatment with caustic of mercerizing strength but contends that he suggested the use of high pulp consistencies.

"Plumstead as well as other witnesses produced on his behalf, deny that the flow sheet attached to exhibit 11 or one similar thereto was either shown or described to them or that a Lannoye pulper was mentioned to them. Exhibit 11 is a flow sheet sketch relating to pulp treatment and while showing a Lannoye pulper to which the pulp and caustic are added does not contain any description thereon to indicate any particular use of this Lannoye pulper such as to bring the use thereof within the terms of the counts.

"Moreover, as pointed out above in the holding that exhibit 11 does not establish even a conception of the invention in issue, the mere fact that a Lannoye pulper was to be used to mix the pulp and caustic does not of itself indicate that it was desired to produce thereby non-fluid masses of such density that there was no free drainage.

"Therefore, as is usual, the circumstances which are important in an originality case are asserted by one party and denied by the other. However it is clear that one of the most important circumstances of the case is not established by either party and especially the junior party, because neither has established that he had at least a conception of the invention in issue prior to the admitted meeting in December of 1928. Since the meeting of the parties is not denied it is certain that there was opportunity for derivation from one party by the other. But it can not be concluded from the testimony on behalf of McCormick and Schwartz that they have sustained the burden resting upon them in establishing a prior conception by them nor a derivation of the invention in issue from them by the party Plumstead.

"Since the junior party has failed to establish any dates prior to the filing of his application, it is unnecessary to consider in detail his motion to amend his preliminary statement.

"Priority of invention of the subject matter in issue is hereby awarded to the senior party Joseph E. Plumstead."

S. P. S. Increases Export Limit

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., May 6, 1936—In a recent meeting of the Sulphite Pulp Suppliers in Stockholm, at which producers from Norway, Finland, Sweden, Czechoslovakia, Austria, Germany and Memel were represented, it was decided to limit exports of sulphite pulp by cartel members for the current year to 2,500,000 tons, according to reports from Vice Consul Walter C. Dowling, Oslo. This sum represents an increase as compared with 1935 of about 150,000 tons. Capacity production for all countries mentioned is estimated at around 4,100,000 metric tons, of which 2,650,000 metric tons represents the combined production of Norway, Sweden and Finland. These countries will thus share the bulk of the increase. The above decision is very welcome in so far as it seems to indicate improved sales possibilities for sulphite pulp, prices for which have also risen recently. The present production curtailment of 25 per cent will continue in effect regardless of the new export agreement.

Brown Co. Claims Must Be Filed by July 1

PORTLAND, Me., April 29, 1936—Trustees in bankruptcy of the Brown Company are notifying bondholders, other creditors and stockholders that all claims against the company must be filed with the court on or before July 1, in order to participate in any plan of reorganization.

ACCENT ON "eye appeal"

"EYE APPEAL" is the theme song of the modern packaging trend. Manufacturers are redesigning old-fashioned packages to attract attention and stimulate the customer's impulse to buy by making the contents appear more desirable. One hears story after story of rocketing sales that result from such package modernization.

When increased sales depend on brightening up a box, a large share of the responsibility naturally falls on the paper manufacturer. One of his problems is to produce board liners that are whiter, brighter, and more opaque. This ceases to be a problem when he selects Krebs pigments to help him do the job. For he will establish new standards of *whiteness*, *brightness*, and *opacity* with these superior white paper pigments.

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PIGMENTS FOR PAPER

KREBS PIGMENT & COLOR CORP.
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Obituary

Z. Marshall Crane

BOSTON, Mass., May 4, 1936—Z. Marshall Crane, aged 58, president of Z. & W. M. Crane, Inc., and vice-president of Crane & Co., Inc., paper manufacturers, of Dalton, Mass., died April 29 at Phillips House, Massachusetts General Hospital, Boston, after a long illness.

Member of a family long identified with Berkshire County, Mass., Mr. Crane was a son of the late Mr. and Mrs. Zenas M. Crane, of Dalton. He was graduated from Hotchkiss School, Lakeville, Conn., in 1896 and Yale University in 1900. He had long been active in behalf of Yale in the Berkshires.

His father established the Pittsfield Boys' Club and he continued his father's interest by adding a swimming pool and auditorium to the building. The family also established a $100,000 fund to assist Dalton students through college.

Following the death of his father, who served on the Governor's council many years ago, Mr. Crane served as executor of the estate and then applied for assignment to an officers' training camp. He was sent to Camp Fremont in California. After the armistice he sought service with the Near East Relief in Russian Caucasus. He was in Russia from March, 1919, to November, 1920. He was a member of the state executive committee for Near East Relief.

During part of the World War, Mr. Crane was chairman of the Berkshire County committee on food production and conservation and established Brookvale Farm in Windsor in the hope of utilizing abandoned farm areas of New England by raising beef cattle. In Dalton, he served the town in numerous capacities and contributed $20,000 toward the construction of a new high school which settled a long standing controversy. He was also a director of the Boston and Albany Railroad since 1918 and a director of the Pittsfield National Bank and Trust Company.

A sister, Mrs. Samuel G. Colt, of Pittsfield, is living.

The funeral was held at his late residence, 444 Main street, Dalton, May 1, with Rev. Dr. Ross Stevenson, of Princeton Theological Seminary, officiating. Burial was in Dalton Cemetery.

Harry W. Reed

WATERTOWN, N. Y., May 4, 1936—Harry W. Reed, former superintendent of the mill of the Hinde & Dauch Paper Company, died last week after an illness of several months. He was 58 years old. During his career he has served as superintendent of paper mills at various places in this country and Canada. Following the abandonment of the mill here several years ago he followed the farming occupation. The survivors are his mother and three sons.

Robert Gair Reports Profit

The report of Robert Gair Company, Inc., and subsidiaries, for the quarter ended March 31, 1936, shows a profit of $80,055 after depreciation, interest on bonds of subsidiary company and dividend on preferred stock of subsidiary company but before interest on income notes and income taxes, comparing with a profit of $281,451 in the quarter ended March 31, 1935.

The provision for interest on income notes and income taxes, it is stated, amounted to approximately $60,000 during the March quarter of 1936, against $78,000 in the March quarter of the previous year.

Paper Demand Fairly Brisk In Boston

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., May 4, 1936—Varying statements were made by jobbers, respectively, in regard to business in the Boston area last week. The average is estimated as fair. In a few instances the volume of fine paper transactions was reported as better than the previous week, with comments of "pretty good" and "very good." In some cases it was rather quiet. In certain quarters, at least, orders from printers fell off. Of late, jobbers have not been getting quite the service as they were from mills on deliveries, taken as a good sign that manufacturers were receiving more orders.

Prices of fine paper showed a stiffening tendency. With quotations on kraft advancing an eighth of a cent May 1, many buyers made sizable purchases so as to secure merchandise on the April prices. Some jobbers of kraft specialties reported business as "pretty good." At the local office of a bag manufacturer, the demand was said to be good, with the market fairly firm. Box boards were quiet to fair.

Paper stock was fairly active. Mixed papers held on the high side, but declined 2½ cents on the low side of the range, making the quotation .20 @ .25. Old newspapers went down 2½ cents to .25 @ .30. Corrugated boxes likewise declined the same amount, so that the range became .37½ @ .42½. Bagging as a whole was not very active, although there was a moderate call for rope, with values unaltered. New domestic rags were in fair demand, with prices at the same levels, as were those of old domestic rags. Foreign rags were less active, with the price of dark cottons declining to 1.85 @ 2.00 from 1.95 @ 2.05.

Chemical Paper Mfg. Co. To Redeem Stock

HOLYOKE, Mass., May 4, 1936—An important capital change in the financial structure of the Chemical Paper Manufacturing Company was made the past week at a special meeting of the stockholders when they voted to redeem and cancel the $300,000 second preferred stock issue.

In return for the 3,000 shares of second preferred stock issue of $100 par value, $60 in cash and a half share of common stock will be given for each share of the stock to be retired.

This necessitated the increase in the company's common stock issue from $1,000,000 to $1,150,000 and required the consent of the common stockholders as well as the preferred stockholders.

The second preferred stock carried with it a 6 per cent. cumulative dividend. The removal of this annual $18,000 dividend burden from the company is expected to improve the status of the two remaining stock issues—the common and the preferred. The change became effective May 1.

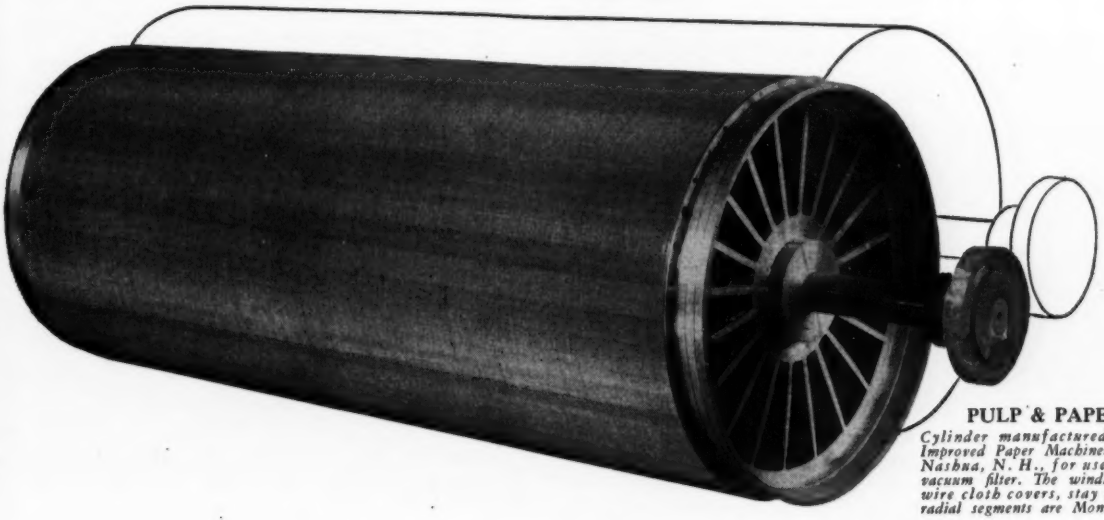
Stevens Paper Mills Buy Crane Mill

[FROM OUR REGULAR CORRESPONDENT]

WESTFIELD, Mass., May 5, 1936—The so-called lower Crane paper mill in this town has been sold to the Stevens Paper Mills, Inc., of this city. The mill which was one of the plants of the Crane Paper Company of Dalton has been idle for about three years, the machinery and other contents having been removed to Dalton.

The purchase places the four mills in town formerly owned by the Cranes in the hands of the Stevens Paper Mills. The new owners will make certain changes and operate the mills as soon as possible. The company makes special papers and the upper mill that it owns has been very busy. Increasing business led it to the present purchase.

2 LIVES *for* 1...



PULP & PAPER
Cylinder manufactured by the Improved Paper Machinery Corp., Nashua, N. H., for use in their vacuum filter. The winding wire, wire cloth covers, stay rods and radial segments are Monel Metal.

That and more is what Monel Metal winding wire and wire cloth offers on cylinder moulds and filters!

PAPER men who KNOW use Monel Metal wire cloth and winding wire for their cylinder moulds and filters.

Paper men who know WHAT?

Who know the *facts* of Monel Metal's records in actual service. Perhaps there is only one main reason for using Monel Metal: the money you save by its outliving other metals in the same service *by 2 to 1, and often more.*

But that one reason is REASON ENOUGH.

We have not space here to list the dozens of performance records we have on file. Send for our free booklet, "Monel Metal in Pulp and Paper Mills," and read them there. But here are a few of the *reasons* why Monel Metal lasts so long:

First: Corrosion resistance. Some of the stocks you send through your filters are strongly caustic, or alkaline; others are acid, containing spent sulphite liquor, residual chlorine, alum, sulphuric acid, or hydrochloric acid. Monel Metal's resistance to *all* of these greatly exceeds that of any other single metal used in this service. Also, Monel Metal is *immune to rust.*

Second: Monel Metal's great strength and toughness. Do you know that Monel Metal is stronger than ordinary structural steel? These properties put up a stiff battle against abrasion and wear.

Cut to a minimum the wear from corrosion and abrasion in the cylinder's work, and your wire filters are bound to last a long time. And they do. We know of a thickener handling bleached sulphite stock the covers on which last, on an average, 2 years. Of a filter for black liquor with a continuous service record of 6 years.

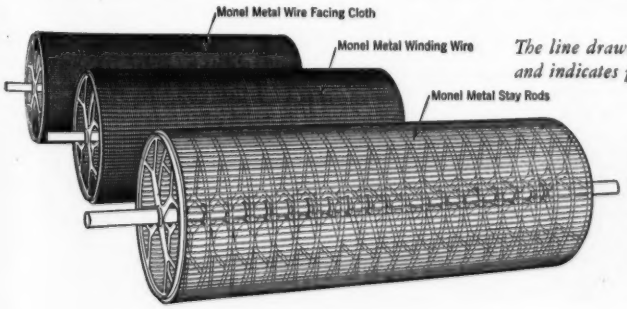
And of course, Monel Metal wire cloth could not go into so many installations, were it not obtainable in a wide variety of weaves, meshes, and wire sizes.

Monel Metal winding wire comes in long lengths up to 10,000 feet. Its tensile strength? 110,000 to 140,000 lbs. p.s.i. And you can wind it on its own diameter without fracture. That takes ductility!

When you use stay rods of Monel Metal, you need less diameter . . . because they have more strength.

Write for the booklet which gives you the facts. Then you'll be one of the paper men who *know.*

THE INTERNATIONAL NICKEL COMPANY, INC.
67 WALL STREET NEW YORK, N. Y.



The line drawing at left shows three stages in construction of a cylinder mould, and indicates parts commonly made of Monel Metal.

MONEL METAL

Monel Metal is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

INCO MONEL METAL

NEKOOSA-EDWARDS IMPROVEMENTS

(Continued from page 15)

entire plant and equipment, the officials will attend a series of meetings with administrators and staff members of the Institute, in which its program and aims will be reviewed and discussed.

The Institute has previously held conferences of the technical representatives of members mills, but this is the first conference specifically planned for executives. The discussions are expected to be unusually fruitful for this reason, and a full attendance is expected. The conference will bring together the executives of more than fifty of the largest paper manufacturers.

Enrollment at the Institute next fall will approximate 45 full-time students, the largest in its history, representing 26 colleges and universities. First year students will begin their training in a pulp wood camp in Upper Michigan a week before the opening of classes.

The departments of pulp and paper technology, under the direction of Dr. Otto Kress and Howard Morgan, will move to offices and laboratories in the new building now being completed. The colloid chemistry group also will be in the new quarters.

Engineers to be enrolled next fall, and the institutions from which they are graduating are: C. E. Ahlm, University of Minnesota; H. J. Allison, Jr., University of North Carolina; R. J. Auchter, Marquette University; Paul Baldwin, Syracuse University; J. W. Bard, Iowa State College; W. J. Budrich, Purdue University; F. E. Culp, Ohio State University; W. A. Grimes, Washington University, St. Louis; R. D. Hinkel and R. W. Miller, Pennsylvania State College; H. H. Houtz, Rensselaer Polytechnic Institute.

Chemists accepted for enrollment are: J. C. Bietzinger, Alleghany College; Ralph Glading, Oberlin College; A. T. Luey, Dartmouth College; Robert Ragan, DePauw University; H. W. Rowe, Wabash College.

K-C Safety Program

In its continuing program for mill safety, the Kimberly-Clark Corporation devoted an entire day at its mill at Kimberly, Wis., last week to talks, demonstrations and motion pictures dealing with the subject. The gatherings at the mill clubhouse were attended by more than 800 persons, and conducted in cooperation with village officials included community safety as well as mill safety.

The principal address was made by S. F. Shattuck, vice-president of the company, and the father of the safety movement. He said the company's interest in the safety of its employees is evidenced by the fact that no compensation insurance is carried and the corporation assumes its own risk for accidents. Because of this, the mill is ever alert to prevent mishaps and keep all machinery guarded. He described safety as a part of good management. Addresses also were made by F. A. Robinson of the industrial relations department, J. A. Limpert, superintendent of the pulp and paper department, J. T. Doerfler, mill manager, and Eugene C. Boyd, a lecturer. A banquet was held as the closing event, with A. G. Briggs, personnel superintendent of the Kimberly mill, as toastmaster. Numerous exhibits were placed in the clubhouse and on the grounds showing among other things the correct way of piling pulp, of hoisting paper, and the consequences of accidents.

R. F. Bellack's New Post

R. F. Bellack, for the last five years advertising manager of the Whiting-Plover Paper Company, Stevens Point, Wis., has rejoined his former advertising agency connection at Wausau, Wis., and the latter firm hereafter will be known as Daniel H. Storay and R. F. Bellack, Affiliated. The Whiting-Plover advertising account will be transferred to this agency.

Mr. Bellack was one of the organizers, and a member of the executive and advertising committees of the Wisconsin Paper Group, handling pool car shipments of Wisconsin mills. He also was a member of the advertising committee of the Rag Content Paper Manufacturers Association. He is responsible for developing the advertising program for Whiting-Plover's "Permanized Papers" and "Keebord Typewriter Papers," and the advertising publication program reaching 500,000 buyers of paper.

Announcement has been made by Mr. Bellack that he will serve as vice-president and editorial director of National Publications, Inc., publishers of "Modern Advertising" magazine.

St. Regis Changes

DEFERIET, N. Y., May 4, 1936—E. P. McGinn has resigned as paper technologist of the local branch of the St. Regis Paper Company, in order to take a similar position with the Champion Fiber Company, of Canton, N. C. He will begin his new duties immediately. Mr. McGinn was graduated from the New York State College of Forestry at Syracuse in 1932 following which he became a technician with the Forest Service at Park Falls, Wis. Later he was associated with the Foster Paper Company, at Utica as chemist. He has also served as secretary-treasurer of the New York section of the Technical Association of the Pulp and Paper Industry.

All offices of the St. Regis Paper Company except the sales department and a section of the traffic department, will be centralized in this village after May 1, according to announcement. Incidentally this move means that most of the employees at the New York office and the Taggart office building, Watertown, will be located in this village where new offices have been built in part of the structure previously known as the filter plant. For the present the purchasing agent, J. Bruce Eskin, is expected to remain in New York but Lee W. Bowker, assistant, will be connected with the new Deferiet offices.

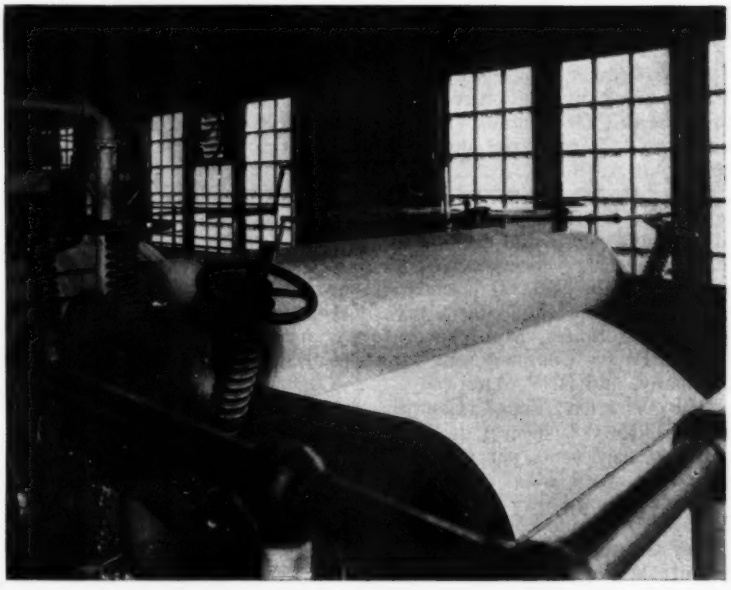
It is expected that Carl B. Martin, vice-president and treasurer of the company, will supervise activities at the new office. Roy K. Ferguson, president of the company, and other officials will remain in the New York office, it was stated. Joseph A. Quinlan, head of the traffic department, will also remain in New York City.

E. A. Sitzer Heads Hurlbut Paper Co.

LEE, Mass., May 4, 1936—At the annual meeting of the Hurlbut Paper Company held last week the following officers were elected: President, Edward A. Sitzer; treasurer, Harold S. F. Bates; secretary and clerk, G. Edward Wells, sales manager, Charles R. Bell.

Mr. Sitzer succeeds Frank A. Juckett, who has not as yet announced his plans for the future. The stockholders adopted a resolution expressing their appreciation of the untiring efforts of Frank A. Juckett, his son, J. Walter Juckett and J. Wesley Joslyn in "maintaining continued operation of the Hurlbut Paper Company during the past five years" and extended to them their best wishes for success and happiness in their new connections.

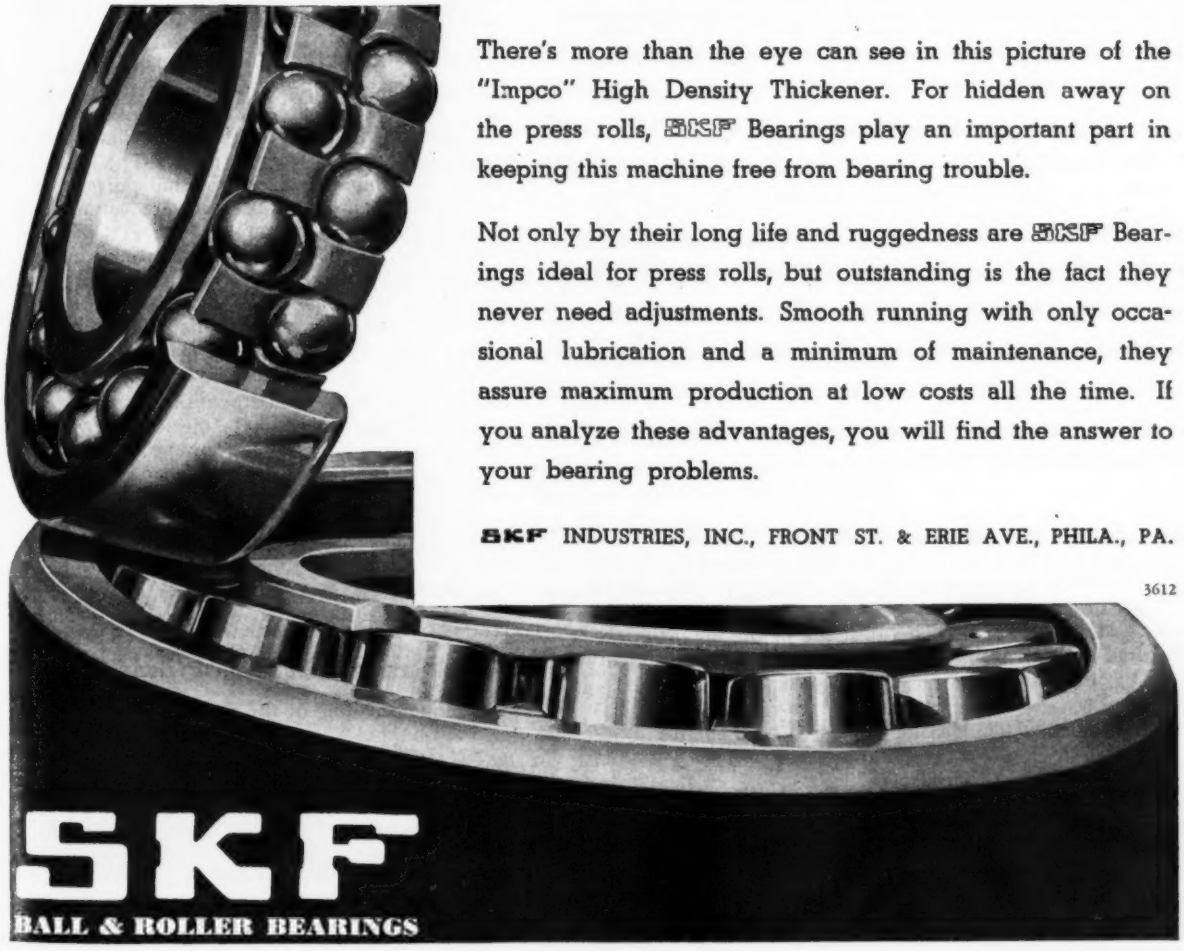
Paul C. Zuhlke, who originally purchased the mill from the American Writing Paper Company and who has maintained a large financial interest in the Hurlbut Paper Company expressed his confidence in the ability of Mr. Sitzer, former vice-president to successfully head the corporation. Mr. Zuhlke pledged his support to the new officers for the benefit of the company and the community.



SKF-EQUIPPED BUILT BY IMPROVED PAPER MACH'Y CORP.

PRESS ROLLS RESIST WEAR

when they're equipped with SKF *Bearings*



There's more than the eye can see in this picture of the "Impco" High Density Thickener. For hidden away on the press rolls, SKF Bearings play an important part in keeping this machine free from bearing trouble.

Not only by their long life and ruggedness are SKF Bearings ideal for press rolls, but outstanding is the fact they never need adjustments. Smooth running with only occasional lubrication and a minimum of maintenance, they assure maximum production at low costs all the time. If you analyze these advantages, you will find the answer to your bearing problems.

SKF INDUSTRIES, INC., FRONT ST. & ERIE AVE., PHILA., PA.

3612

SKF

BALL & ROLLER BEARINGS

Government Paper Awards

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., May 6, 1936—The Mathers-Lamm Paper Company will furnish the Government Printing Office with 2,500 pounds (5,000 sheets) of 26 x 38 newsboard at 1.72 cents per pound, bids for which were received on April 17.

The Lanston Monotype Company will furnish 16,700 pounds of monotype keyboard and casting machine paper at 9.5 cents per pound less 1 per cent.

The Printing Office received identical bids at 4.75 cents per pound for 880,000 pounds of supercalendered book paper from the following firms: Paper Corporation of the United States, Stanford Paper Company, Jessup & Moore Paper Company, Barton, Duer & Koch Paper Company, and R. P. Andrews Paper Company.

The Virginia Paper Company will furnish 15,075 pounds (150,000 sheets) of 21 x 32 white sulphite ledger paper at 6.47 cents per pound, bids for which were received on April 22.

The Printing Office has also received the following bids for 57,500 pounds (500,000 sheets) of offset book paper; Paper Corporation of the United States, 5.72 cents per pound; Whitaker Paper Company, 5.75 cents; John F. Post, 5.75 cents; Barton, Duer & Koch Paper Company, 5.75 cents; Aetna Paper Company, 5.75 cents; R. P. Andrews Paper Company, 5.72 cents; Mathers-Lamm Paper Company, 5.70 cents, and J. R. Rowarth Paper Company, 5.85 cents.

For 5,000 sheets of red railroad board; Whitaker Paper Company, at $27.94 per M sheets; Dobler & Mudge Company, $28.80; Reese & Reese, Inc., $27.94; Virginia Paper Company, $28.80; Old Dominion Paper Company, $29.89; J. R. Howarth Paper Company, $29.49; and George W. Millar & Company, $29.75.

An Invitation From Crane Co.

The Crane Company extends a cordial invitation to the members of the American Pulp and Paper Mill Superintendents' Association to stop in Chicago either on the way to Grand Rapids for the convention or on the way home. Tom Ireland, Crane's representative in charge of pulp and paper activities, will be glad to welcome you at any time. If you would be interested in making a tour through the mammoth Chicago plant of Crane Company, see Tom at the convention and he will be glad to make arrangements for you.

Resigns from Sulphite Paper Manufacturers

Having resigned as vice-president of the Elk Paper Manufacturing Company of Childs, Md., William A. Cohen has also resigned from the Board of Governors of the Sulphite Paper Manufacturers Association.

In forwarding his resignation, Cohen stated he would still remain as a director of the Elk Company, although he did not intend to take any active part in its operation or sales. He also expressed his pleasure at the opportunities that had been given him to cooperate with the other members of the association during the past two years.

Move Wax Paper Dept. To Nashua

[FROM OUR REGULAR CORRESPONDENT]

HOLYOKE, Mass., May 5, 1936—The waxed paper department of the Package Paper Company of this city is being transferred to Nashua, N. H., where the Nashua Gummed Paper Company of that city which owns the local plant has a mill. The cellophane paper unit will be kept in Holyoke.

A. J. Manning, Chairman of Welfare Fund

Arthur J. Manning of the Union Bag and Paper Corporation, has accepted the chairmanship of the committee to solicit contributions among paper industries to the Citizens Family Welfare Committee's campaign to raise a minimum of $1,500,000 to help private family welfare agencies meet extraordinary financial needs.

The appointment was announced at the committee's headquarters at 14 Wall street by Laurence M. Marks, executive chairman of the campaign.

In the past year, the private family welfare agencies, seeking to care for the human needs of the city's distressed in the current emergency, have made expenditures in excess of their income and contributions. The committee's aim is to raise sufficient funds to make it possible for the agencies to carry on their essential work.

The agencies to be benefited by funds raised during the campaign are: Charity Organization Society; Catholic Charities of New York; Jewish Social Service Association; New York Association for Improving the Condition of the Poor; Brooklyn Bureau of Charities; Catholic Charities of Brooklyn; Brooklyn Association for Improving the Condition of the Poor; United Jewish Aid Societies of Brooklyn; Catholic Charities of Queens; Queens Family Welfare Society and Associated Charities; Staten Island Social Service, Inc.; Catholic Charities, Staten Island, and Family Welfare Division of the Salvation Army.

American Writing May Buy Pulp

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, May 4, 1936—Judge McClennan has decreed that the management of the American Writing Paper Company may enter into contracts with suppliers of pulp in order to guarantee their supply of bleached and unbleached sulphite over the last half of this year. The Court limited the amount that might be spent for that purpose to $650,000, which the company conservatively estimates is the least amount that it should purchase for that period. Pulp required for the first half has been secured. The amount to be contracted for under the Court's authority will be approximately 13,000 tons. The Company estimates that it will require well in excess of this amount but believes that it can purchase on the open market from time to time, enough additional for its requirements.

An interesting phase of this petition is the statement by Thomas H. Blodgett, that the American Writing Paper Company's business this year is running ahead of the same period of 1935, insofar as tonnage made and shipped is concerned, and that the present indications point to Pulp requirements substantially in excess of last year. In view of the tightening market for unbleached sulphite, Mr. Blodgett goes on to say, the prospect for higher prices makes it necessary to contract definitely.

Heads Sandy Hill Iron & Brass Works

At the annual meeting of the Sandy Hill Iron and Brass Works, Hudson Falls, New York, held May 1, Frank A. Juckett, of South Lee, Mass., was elected president, to succeed the late Archie J. Kennedy; Dr. Richard C. Tefft, Jr., of Boston, Mass., was re-named vice-president, and W. J. Elliot Simpson, of Hudson Falls, was re-elected secretary and treasurer. Harry L. Broughton and Chas. W. Kellogg, of Hudson Falls, together with the above named officers, were named as directors for the ensuing year.

QUAKER KEYSTONE CHLORINE

THE INCREASING DEMAND for Quaker Keystone Chlorine in the paper industry is the result of the dependability of our product and service. Furthermore, the Pennsylvania Salt Manufacturing Company has continually pioneered in the development of Chlorine products and processes for the pulp and paper industry.

In 1898, the Pennsylvania Salt Manufacturing Company began the large scale electrolytic production of Chlorine when the Wyandotte Plant, overlying enormous salt beds on the Detroit River, was put into operation.

In 1909, Pennsylvania Salt Manufacturing Company loaded the first tank car of Liquid Chlorine ever shipped.

Today, ample supplies of Quaker Keystone Chlorine are always available at our conveniently located plants.

Many of the largest pulp and paper plants have continuously used Quaker Keystone Chlorine.

●

OTHER CHEMICALS FOR THE PAPER INDUSTRY

CAUSTIC SODA · SODIUM ALUMINATE · ALUM · PENCHLOR (*Supertest Calcium Hypochlorite*) · PENCHLOR ACID-PROOF CEMENT · ANHYDROUS AMMONIA BLEACHING POWDER (*Standard Strength*) · CARBON TETRACHLORIDE

Est. 1850 PENNSYLVANIA SALT MFG. CO.

EXECUTIVE OFFICES, WIDENER BLDG., PHILADELPHIA, PA.

Branch Sales Offices: New York—Chicago—St. Louis—Pittsburgh—Tacoma—Wyandotte

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FUTURE MEETINGS

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, Summer International Meeting in Canada, August 3 to 7, Montreal, Quebec, The Saguenay. Details may be obtained from the secretary, R. G. Macdonald, 122 East 42nd street, New York.

NEW ENGLAND SECTION, Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Nonotuck Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION, Technical Association of the Pulp and Paper Industry—fourth Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION, Technical Association of the Pulp and Paper Industry—second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION, Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park-American Hotel, Kalamazoo, Mich.

AMERICAN PULP AND PAPER MILL SUPERINTENDENTS' ASSOCIATION, Annual convention, Grand Rapids, Mich., June 24-26, 1936.

FOREIGN PAPER TRADE

Exports of paper and paper products from the United States during February declined to some extent compared with the preceding month. Compared with the corresponding month last year, the volume of February's shipments also decreased, according to the Forest Products Division of the Department of Commerce. The aggregate value, however, was approximately 10 per cent in excess of February 1935. This rise was partly due to an increase in the prices of various classes and partly to the fact that an increase in the volume of shipments occurred chiefly in the higher priced lines, such as writings, surface-coated papers, greaseproof and waterproof wrappings, bristols, and vulcanized fiber. Exports of a number of converted articles also show a gain compared with February, 1935. Among the coarse groups, shipments of boxboards, which more than doubled in volume compared with a year ago, alone showed an increase over the corresponding month last year. Exports of newsprint, wrapping papers, and old newspapers were greatly under the February 1935 shipments. The figures covering exports of tissue and crepe papers are slightly higher than those for the corresponding month last year. It is likely, however, that a shrinkage in exports of these papers actually occurred, since jumbo rolls of tissue which were formerly classified with toilet paper have been transferred to the tissue and crepe classification. Aggregate exports of the two items during February were approximately 25 per cent below the combined figures reported for February, 1935.

Total shipments of this group for the month of February were valued at 1,684,930 as against $1,822,198 in January and $1,548,207 in February 1935. It is not possible to state definitely the tonnage of these exports since insulating and wall boards and paper hangings are not reported by weight. Eliminating these three classes and also a substantial amount included under the classification "other paper and paper products" for which value only is shown, the volume of paper exports dropped from 17,993 tons in February 1935 to 16,256 tons for the corresponding month this year. January exports totaled 18,663 tons, and, it will be noted, were larger than either month. The products eliminated represent about one-fifth of the total valuation.

Exports of paper base stocks picked up during February but were nevertheless 10 per cent under the February 1935 shipments. Exports of both sulphite wood pulp and rags and other waste, which represent the bulk of these shipments, were considerably less than a year ago. Total exports in this group during February were valued at $651,880, of which $213,392 represented 2,961 tons of bleached sulphite and $326,013 represented 7,743 tons of unbleached sulphite. Rag exports, amounting to 841 tons, were valued at $63,445.

Imports of paper and paper products during February were valued at $6,442,343, of which amount $5,441,937 represented 157,456 tons of newsprint and $1,000,406 other classes of paper and paper products. Newsprint receipts during February dropped 12 per cent compared with the preceding month but were 14 per cent higher than for February 1935. Imports of other classes of paper dropped off 10 per cent in aggregate value compared with January, but were 28 per cent above those reported for the corresponding month last year. Increases occurred chiefly in receipts of "other printing papers," kraft wrapping paper, and boards, exclusive of pulp boards in rolls.

Imports of paper base stocks into the United States during February were considerably heavier than a year ago, due principally to the increased takings of wood pulp, although imports of rags and other paper-making waste were also greatly in excess of those reported for February, 1935. The leading items on this schedule are bleached and unbleached sulphite pulps and unbleached sulphate pulp. Imports of the last were nearly double those for the corresponding month last year, while imports of bleached sulphite were 43 per cent and of unbleached sulphite 21 per cent higher. Receipts of both rags and other paper-making waste during February were more than double the amount reported for February, 1935. Imports of pulpwood, while on a level with January's receipts, were 16 per cent under the amount credited to February of last year.

Total receipts of paper base stocks during February were valued at $6,550,593 as against $7,985,968 for January and $4,643,036 for February, 1935. Receipts for the past February comprised: 155,755 tons of wood pulp valued at $5,814,149, 8,086 tons of rags and 5,380 tons of other waste valued at $399,977, and 55,809 cords of pulpwood valued at $336,467.

Approves Listing of Champion Paper

[FROM OUR REGULAR CORRESPONDENT]

DAYTON, Ohio, May 4, 1936—The New York Stock Exchange has just approved listing of common stock of the Champion Paper and Fibre Company of Hamilton, it was said by Charles C. Benedict, attorney for the company, at Cincinnati.

Trading will begin when the listing is declared effective by the Securities and Exchange Commission.

Preferred stock and debentures of the company are already listed on the New York market. These issues are also listed on the Cincinnati Stock Exchange.

On April 24, for instance, only three issues on the Cincinnati Exchange were able to move against the downward trend. One of the exceptions was Champion Paper, the trading features, with a turnover on that date of almost 1,000 shares. The total sales reached the largest figure in several weeks, due largely to activity in the paper company. Volume expanded to 1,779 shares against 865 shares the preceding day.

The recent issues of the Champion Paper and Fibre Company of Hamilton, to provide funds for the $3,500,000 pulp mill construction near Houston, Texas, have aroused considerable interest in investment circles. It is understood the offerings are being taken up in large blocks by the public and that it is proving to be a popular investment.

To Proceed With Reports on Novel News

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., May 6, 1936—Wayne C. Taylor as acting secretary of the Treasury, has authorized appraising officers to proceed with their appraisement reports covering novel news printing paper from Canada without regard to any question of dumping. In a letter to collectors on this point the acting secretary said:

Reference is made to the notice of suspected dumping issued by the appraising officer at Rouses Point, New York, on March 10, 1934, under the provisions of the Anti-dumping Act, 1921, covering importations of "novel news" printing paper from Canada.

Appraising officers who have been withholding appraisements of "novel news" printing paper from Canada, by virtue of the issuance of the above-mentioned notice of suspected dumping, are authorized to make their appraisement reports without regard to any question of dumping.

Maine Pulp for Japan

PORTLAND, Me., May 4, 1936—Alvaro Chaves, foreign department manager, said the Brown Company would export 20,000 tons of solka, a sulphate pulp product, to Japan this year through the port of Portland. Mr. Chaves said two Japanese freighters would come here monthly for the cargo, used extensively in Japan for the manufacture of rayon.

This year's total, said Mr. Chaves, would be about triple the amount previously exported via Portland. The company produces solka at its Berlin, N. H., mills.

Production Ratio Report

These statistics are based upon paper production reports to the American Paper and Pulp Association:

COMPARATIVE MONTHLY SUMMARIES

Month	1936	1935	1934
January	76.1%	65.8%	.....
February	77.9%	70.0%	.....
March	76.0%	70.5%	.....
April	.....	70.0%	.....
May	.....	69.4%	.....
June	.....	72.3%	.....
July (b)	.....	67.8%	.....
August	.....	70.9%	.....
September (c)	.....	75.0%	59.4%
October	.....	75.6%	64.7%
November	.....	75.3%	61.7%
December (a)	.....	74.3%	62.1%
Year	.....	71.2%	.....

COMPARATIVE WEEKLY SUMMARIES

CURRENT WEEKS, 1936		CORRESPONDING WEEKS, 1935	
*April 4	80.2%	April 6	70.8%
*April 11	83.0%	April 13	68.7%
*April 18	81.7%	April 20	69.9%
*April 25	80.5%	April 27	70.6%

The following statistics show the number of mills reporting by ratio groups:

	Number of Mills Reporting, Current Weeks			
Ratio Limits	April 4, 1936	April 11, 1936	April 18, 1936	April 25, 1936
0% to 50%	88	65	71	53
51% to 100%	255	273	252	198
Total Mills Reporting	343	338	323	251

* Subject to revision until all reports are received.
These data exclude (a)—Christmas Day, (b)—Fourth of July, (c)—Labor Day.

PAPERBOARD OPERATING RATIOS

According to reports from the National Paperboard Association, per cents of operation, based on "Inch-Hours," were as follows:

1934	1935	1935	1935	1936
Sept. .. 62%	Jan. .. 61%	May .. 61%	Sept. . 69%	Jan. .. 61%
Oct. ... 63%	Feb. .. 67%	June .. 65%	Oct. .. 76%	Feb. .. 67%
Nov. ... 56%	Mar. . 67%	July .. 59%	Nov. . 70%	
Dec. (a) 53%	Apr. .. 61%	Aug. . 65%	Dec. . 60%	

Week ending March 7, 1936—68%	Week ending April 4, 1936—70%
Week ending March 14, 1936—67%	Week ending April 11, 1936—68%
Week ending March 21, 1936—65%	Week ending April 18, 1936—68%
Week ending March 28, 1936—65%	Week ending April 25, 1936—68%

Ask Bids on Waste Paper

WASHINGTON, D. C., May 6, 1936—The Government Printing Office will receive bids on May 25 for the purchase of paper shavings, waste paper, etc., that may accumulate at the Printing Office during the fiscal year beginning July 1 next. Among the items on which bids will be taken are included:

100,000 pounds of white and colored shaving from blank books, etc.

400,000 pounds of white shavings from book and mimeograph paper, etc.

100,000 pounds of white shavings from book papers, mixed with color.

100,000 pounds of white and colored shavings and clean waste.

200,000 pounds of newsprint and manila shavings and clean waste.

200,000 pounds of postal card bristol trimmings and clean waste.

70,000 pounds of used white monotype keyboard paper.

200,000 pounds of binders board, strawboard and chipboard cuttings.

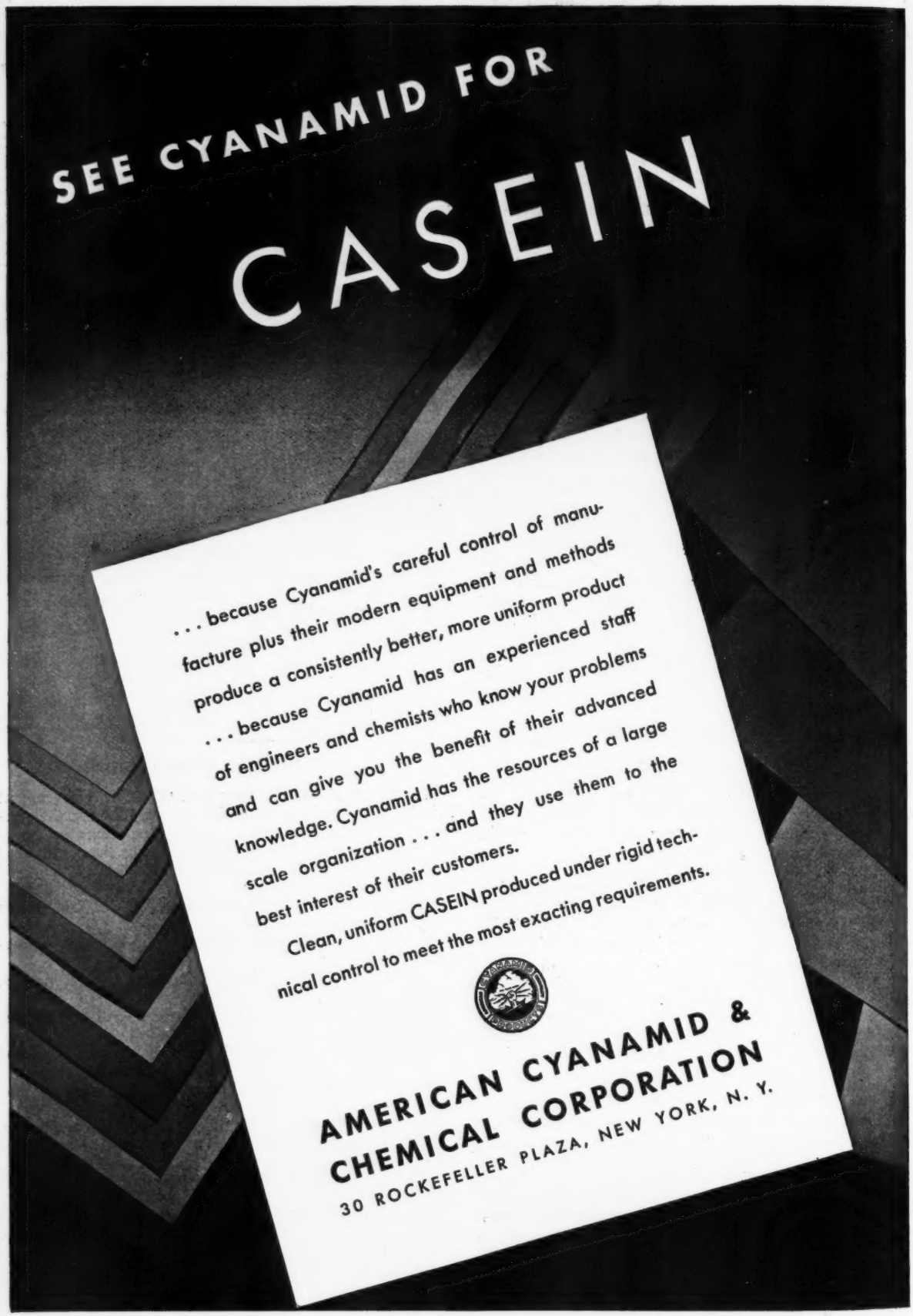
3,000,000 pounds of paper wrappers from rolls and flat stock.

400,000 pounds of printed paper waste, from ground wood.

400,000 pounds of discarded publications.

4,000 pounds of wrapping twine and rope from bundles.

15,000 pounds of waste and scrap book cloths.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Section of the
Technical Association of the Pulp and Paper Industry
Edited by Ronald G. Macdonald, Secretary

Titanium Pigments in Paper Making*

By William R. Willets[1]

Titanium pigments in paper making can no longer be considered as a novelty, since their unique properties have resulted in a rapid development of their use in many different phases of the art.

However, it may be well at this time to review briefly some of the more important development along these lines, with the view in mind of summarizing what has already been published in the literature, and also of attempting to point out those places in the industry where titanium pigments are regularly being employed.

Pigments

The manufacture of titanium has been discussed at considerable length in previous publications, so only a brief reference to it will be made herein (*5*) (*9*) (*12*) (*14*) (*16*) (*17*). The most important source of titanium is ilmenite ore (theoretically an iron titanate, $FeTiO_3$ or $FeOTiO_2$). The concentrated ilmenite ore is pulverized and digested with concentrated sulphuric acid which results in the formation of a mixture of titanous and ferrous sulphates. By various methods, extraneous material and iron are removed from this mixture and a clarified solution of titanous sulphate remains. For the composite pigments, titanium dioxide is precipitated by hydrolysis at elevated temperatures and pressures on blanc fixe (for the titanium-barium composites) or on calcium sulphate (for the titanium-calcium composite). For the production of pure titanium dioxide, no base is used. By means of the most careful control, great uniformity in particle size, composition, covering power, etc., is maintained.

There is no need in this review to go into any detail regarding the chemistry of titanium, since this has been covered rather fully in standard reference works on the subject and in the articles, too many to mention herein, which have appeared in the literature during past years (e.g. *14*).

It might be well to note, however, that a definite scheme has been devised for the analysis of paper ash containing titanium pigments (*8*). Space does not permit of reviewing the quantitative procedure in detail herein, but the qualitative test for titanium might be of interest:— About 0.5 grams of the paper ash is boiled with 20 cc. of concentrated sulphuric acid to which has been added 10 grams of ammonium sulphate. After cooling, the solution is diluted to 100 cc. with water and heated to boiling. The solution is allowed to cool, and is then filtered to remove barium sulphate, silica, etc. If a yellow-orange or red-orange color develops upon the addition of hydrogen peroxide to this solution, the presence of titanium is indicated. The depth of color will be dependant on the concentration of titanium.

Although titanium pigments are probably familiar to most papermakers, it might be advisable to tabulate their more important properties:—

	Titanium Dioxide (Titanox A)	Titanium Barium Composite (Regular) (Titanox B)	Titanium Barium Composite (Special) (Titanox B-17)	Titanium Calcium Composite (Titanox C)
Composition	Pure TiO_2	25% TiO_2 75% $BaSO_4$	17% TiO_2 83% $BaSO_4$	30% TiO_2 70% $CaSO_4$
Color	White	White	White	White
Average Size of Aggregates	0.3 microns	0.55 microns	0.55 microns	0.55 microns
Form	Roundish amorphous aggregates			
Specific Gravity....	3.9	4.3	4.3	3.1
Solubility	Insoluble in water, dilute alkalies, acids, organic solvents, etc.			$CaSO_4$ base slightly soluble in water
Chemical Activity..	Absolutely inert under all papermaking conditions, no reactivity with size, alum, silicate, casein, etc.			
Refractive Index...	2.55	1.90	....	1.91
Brightness	96%	96%	96%	96%

These properties render titanium pigments exceedingly valuable for papermaking. As has been frequently pointed out in the past, fillers having high refractive indices and suitably small particle size will be far better opacifying agents than the ordinary fillers which have refractive indices similar to that of cellulose. Likewise, the high brightness and good, neutral white color of these pigments are distinctly advantageous in the production of white and bright papers. The fine, uniform particle size tends to give the paper an excellent surface which will result in optimum printability (*4*) (*6*) (*7*) (*10*) (*11*) (*15*) (*16*) (*18*) (*20*) (*21*).

In addition to these points, it is well to note that the opacity obtained by the use of titanium pigments is so great that only small amounts are needed to produce a given effect. Since such small amounts are needed, it is evident that the effect on strength, bulk, sizing characteristics, etc., is therefore much less than if larger amounts of filler were needed, as would be the case with the ordinary paper loading materials (*24*).

It is also evident, from results already published, that the greatest increases in opacity and brightness occur with

* Presented at the meeting of the Lake States Section of the Technical Association of the Pulp and Paper Industry, Appleton, Wis., Jan. 14, 1936.

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the smaller additions of titanium pigments, that is to say, it is easier to opacify a transparent sheet than a more opaque one. There exists a considerable range of high opacity and brightness, at higher pigmentations, unobtainable with any reasonable amount of the more common fillers (e.g. clay) (*16*) (*18*) (*19*).

Methods of Application

To date the most common method of using titanium pigments has been as beater fillers. The usual procedure is to add the pigment together with the size early in the beater cycle. Toward the end of the beater cycle, sufficient alum should be added to complete the sizing reaction. The actual amount of alum will depend on a great many different factors: hardness of the water, type of alum, etc. No risk is involved from discoloration regardless of the pH, since titanium pigments are absolutely inert under all paper making conditions (*19*).

While the retention of titanium pigments is usually better than that of clay, etc., it should be pointed out that the retention of any filler is affected by many factors among which might be mentioned:—fiber length and other pulp characteristics, beating, use of rosin and alum, degree of suction on the paper machine, machine speeds, basis weight, reuse of white water, etc. (*23*).

The main difficulty involved in the use of pigment in the beater is the fact that a certain amount is always lost through the machine wire. This loss, while considerably less than for ordinary fillers, may still be appreciable, especially where a mill does not have a closed white water system. For this reason, various methods have been developed for the application of titanium pigments to the surface of the sheet, usually in conjunction with a starch solution (*22*). Such suspensions may be applied in almost innumerable ways:—by means of a size tub as a separate operation, or placed in the center of the drier section, usually on the floor below, by calender sizing operations, to the wet web of paper by spraying devices on the machine wire, between the presses or at other convenient points, by conversion of the last press section into a sizing press, etc. Likewise, various methods of "semi-coating" are in operation in which the coating apparatus is an integral part of the machine.

It is logical, too, that titanium pigments have found a definite place in coating, in fact, this phase was one of the earliest to be developed (*1*) (*2*). No difficulties are encountered in such use, as the pigments handle in much the same manner as clay, having approximately the same casein ratio.

Commercial Applications

There are practically no types of paper in which titanium pigments have not been used, although even until comparatively recent times, it was thought that their use would be limited to only the more expensive grades (*3*). However, such is not the case as the following notes will indicate.

Titanium pigments either alone or in conjunction with clay, talc, chalk, etc., are finding considerable use in book paper, because they increase opacity and brightness and improve printing qualities, while at the same time reducing "show-through" to a minimum (*24*) (*25*). In one particular instance, the publisher of a "quality" magazine found that he could not print his ordinary sheet without excessive "show-through", due largely to the amount of solid color work involved in advertising material, and in the pictures used to illustrate the articles. The original sheet contained 7 to 8 per cent of clay. When approximately half of this clay was replaced with the titanium-barium-composite, (*Titanox B*), the "show-through" difficulty was eliminated, and later on, it was found possible to reduce the weight of the sheet being used approximately 5 per cent. This pigmented paper was still better than the original heavier paper which contained no pigment.

For similar reasons, titanium pigments are being used to a considerable extent in the thin printing papers used for Bibles, hymnals, dictionaries, encyclopedias, etc. One such light weight paper having a basis weight of 30 pounds (25x38, 500) had an opacity of over 90 per cent. This sheet contained about 2.5 per cent of titanium dioxide and about 18 per cent of chalk.

Since strength is of primary importance in bond and ledger papers, titanium dioxide is usually the pigment selected since it is the most effective opacifying agent known, and only small amounts are required to produce a given result. Consequently, the ash content is not increased to any great extent, and therefore the strength and sizing characteristics are not affected. The following data were obtained on samples of commercial rag content papers:

	No Pigment	3.8% Titanium Dioxide	No Pigment	3.8% Titanium Dioxide
Basis weight lbs. (17x22, 500)	16	16	20	20
Opacity	79%	90%	85%	95%
Mullen (lbs./sq. in.)	41.9	36.4	46.4	44.2
Tensile (lbs. for 1" wide strip)				
Machine direction	29.7	28.7	37.2	36.6
Cross machine direction	16.3	13.3	19.5	17.3
Average	23.0	21.0	28.3	27.0
Tearing (grams)				
Machine direction	47.6	47.2	61.0	62.0
Cross machine direction	40.6	38.0	57.4	54.0
Average	44.1	42.6	59.2	58.0
Double folds				
Machine direction	....	....	671	707
Cross machine direction	....	....	332	225
Average	....	....	502	466
Caliper	3.3	3.2	4.2	4.0

Although the pigmentation in these cases was fairly high, with resultant large increases in opacity, yet the strength was not reduced to any great extent.

In still another instance, the opacity of a 16 pound sulphite bond was increased from 77.5 per cent to 86 per cent by the presence of 2.5 per cent of titanium dioxide, and the opacity of a 20 pound sulphite bond was increased from 85.5 per cent to 92.5 per cent by the presence of 2.7 per cent of this pigment.

These points are also of interest when envelopes are considered. These are generally of one of two types; the bond type where low ash and high strength is of primary importance, and the book type, where ash and strength are of less importance. In any event, satisfactory opacity may be obtained by the use of titanium pigments.

In tissue papers, titanium dioxide is generally the pigment used, since only small amounts are needed to produce the desired effect, and the strength is consequently affected little if at all. Such use improves the general appearance of the sheet since it tends to "close up" the formation. These facts are exceptionally important where the tissue is to be printed, because the opaque white background resulting from such use enhances the effect of the printed design. In one case, the opacity of a 10 pound (24x36, 480) tissue was increased from 31.3 per cent to 45.1 per cent by the presence of 1.2 per cent titanium dioxide.

Recently, rapid strides have been made towards improving the quality of catalog papers, which in the past have often been defective in color and opacity. This improvement may be accomplished by the use of titanium pigments in the beater, but more recently, processes for "semi coating" have come into use. In such cases titanium pigments, because of their excellent fineness, color, brightness and covering power, may be employed with optimum results. Their use effects the masking of the color of the groundwood-sulphite stocks generally used for catalogs and the cheaper grades of magazines, with consequent improvement in finish, opacity and printing qualities. It is also

possible in many cases to use a lighter weight titanium coated sheet than would otherwise be necessary, thus resulting in savings in postage, without detracting from those qualities essential to good catalog paper.

The use of titanium pigments in the top liner of a board results in greatly improved appearance, since the gray filler stock does not show through the liner and dull its appearance. Such use often permits of a lighter weight liner than would otherwise be necessary, because of the increased opacity of the liner resulting from the use of pigment. These lined boards are finding almost universal application; such as boxes for various purposes, food cartons, picnic plates, show-cards, etc. A pigmented liner will show practically no discoloration in contact with oils, fats or greases, so these boards are exceedingly valuable for packaging meats (such as bacon), butter, lard, oleomargarine, etc., for bottle caps and similar products. As has been mentioned in connection with other types of paper, printing will show to optimum advantage on a titanium pigmented surface.

Less Costly Stock May Be Used in Many Cases

In many cases, titanium pigments permit the use of a darker and less costly stock, and savings in bleaching materials may ensue from this fact. Frequently, mills keep supplies of titanium pigments on hand, so that they may at a moment's notice correct the appearance of off-colored stock in order to keep their finished product up to a definite standard of whiteness, opacity, and brightness.

Titanium pigments, and more especially, the composite pigments are being used in the coating color for coating paper and board because of their high covering power, brightness and excellent white color. Naturally, the amount to be used in conjunction with the other mineral constituents will depend on the specific demands of the case in question. In this particular field, the special titanium-barium-composite (*Titanox B-17*) is being used in conjunction with clay, chalk, etc., to a large extent. Although an increase in opacity has not been of as great importance in coated papers as in printing papers of other types, yet the use of light weight coated sheets in which opacity is a factor is becoming more prevalent. Here titanium pigments are valuable because of their high opacifying power, and at the same time their achievement of marked improvements in color and brightness.

The foregoing review indicates briefly the many phases in paper making where titanium pigments may be used to advantage. Generally, each individual case presents its own specific problem, and it is manifestly impossible in an article of this nature to go into any great detail on any one question.

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Symposium on Fiber Identification

Arrangements have been made by the Institute of Paper Chemistry and the Technical Association of the Pulp and Paper Industry to put on a symposium and round table discussion on the subject of the identification and estimation of fibers. This will be held from June 9 to 18, 1936 at the Institute in Appleton, Wis., and will be open to members of the Technical Association.

The first week, from June 9 through June 13 will be devoted to a series of lectures, demonstrations and laboratory experiments on the techniques involved in the preparation of slides for fiber work, in the staining of various fibers by the "C" stain and other stains developed by John Graff of the Institute staff, and finally, in the count method for evaluating the fiber composition of the slides. This work will be carried out under the direction of Mr. Graff.

The second week from June 15 through the 18th it is proposed to hold the symposium on identification and estimation of fibers. Mr. Graff will point out the things that the fiber analyst is up against in these days of many types of fibers. Because of the experience gained in connection with paper and pulp grading work at the Institute, considerable information has been gained concerning the problems which confront the analysts in various parts of the country and with various types of papers. A number of specialists from the industry will be present to discuss phases of this subject.

It is hoped and expected that at the conclusion of the symposium a policy and method for fiber identification and estimation will be evolved, reporting of which can be agreed upon by the group and then presented to the Technical Association with recommendations as to adoption.

Attendance at this symposium will be limited to forty members of the TAPPI. There will be no fee charges but members will be expected to pay their own transportation and hotel expenses. The hotels in Appleton, Wisconsin are the Conway Hotel and Hotel Appleton. Any member of TAPPI may apply for appointment as a delegate to the symposium. If more than 40 apply a method of selection will be made which will be fair to all concerned. Write to R. G. Macdonald, secretary of TAPPI, 122 East 42nd street, New York, N. Y.

The Structure of Paper Pulp Fibers

By William Seifriz[1] and Charles W. Hock[1]

Abstract

The microdissection of paper-pulp fibers shows them to be bundles of fibrils. These primary fibrils are in turn made up of much finer secondary fibrils, the diameter of which approaches the limit of microscopic visibility. Thus is the striated structure seen in the cellulose wall of plant cells and in cotton fibers with both light-field and dark-field illumination shown to be a real property and not due simply to surface irregularities or diffraction phenomena.

Three-quarters of a century ago, Nägeli *(4)* described the plant cell wall as a lamellated structure. The lamellae were in certain cases shown to be striated, that is to say, built of striae or fibrils in parallel orientation.

Natural cellulose in a variety of forms has been shown to consist of fine fibers or fibrils. This view is substantiated by such methods as direct microscopic observation, maceration, staining, dark-field, and polarized light. There are, however, those who still oppose this conclusion. Further evidence, especially by another method, would, therefore, seem desirable. It is the purpose of the present investigation to give such evidence, namely, to verify by micromanipulative methods the fibrillar structure of wood fibers and thus confirm earlier evidence based on dark-field illumination, the reality of which has been questioned.

Both light-field and dark-field illumination have shown natural cellulose (e. g. cell walls, cotton fibers and paper-pulp fibers) to be striated, thus suggesting that it is composed of parallel oriented fibrils *(5, 7, 8, 10)*. As the striae seen in light-field may be superficial, i. e. surface convolutions, and as dark-field illumination depends upon diffraction phenomena which may be readily mistaken for real structures, it seemed desirable to attempt to prove the existence of a fibrillar structure in wood fibers by another method. The present paper is such a contribution.

Microdissection

The method employed was microdissection. The technique involves the use of a mechanical manipulator by means of which delicate but rigid glass needles are controlled. Several types of instruments are now to be had; the model used in these experiments being the Zeiss-Peterfi micromanipulator.

The material consisted of two samples of paper pulp (Rayonier bleached sulphite pulp); one, a dry preparation of unbeaten material; the other a wet mass of very highly beaten pulp. Both were kindly supplied to us by Dr. A. W. Kenney of the E. I. duPont de Nemours Company, to whom we are also indebted for suggestions and help criticism.

When a paper-pulp fiber is viewed in direct light (light-field illumination) it is seen to be marked by many surface lines which may represent surface folds, convolutions, or

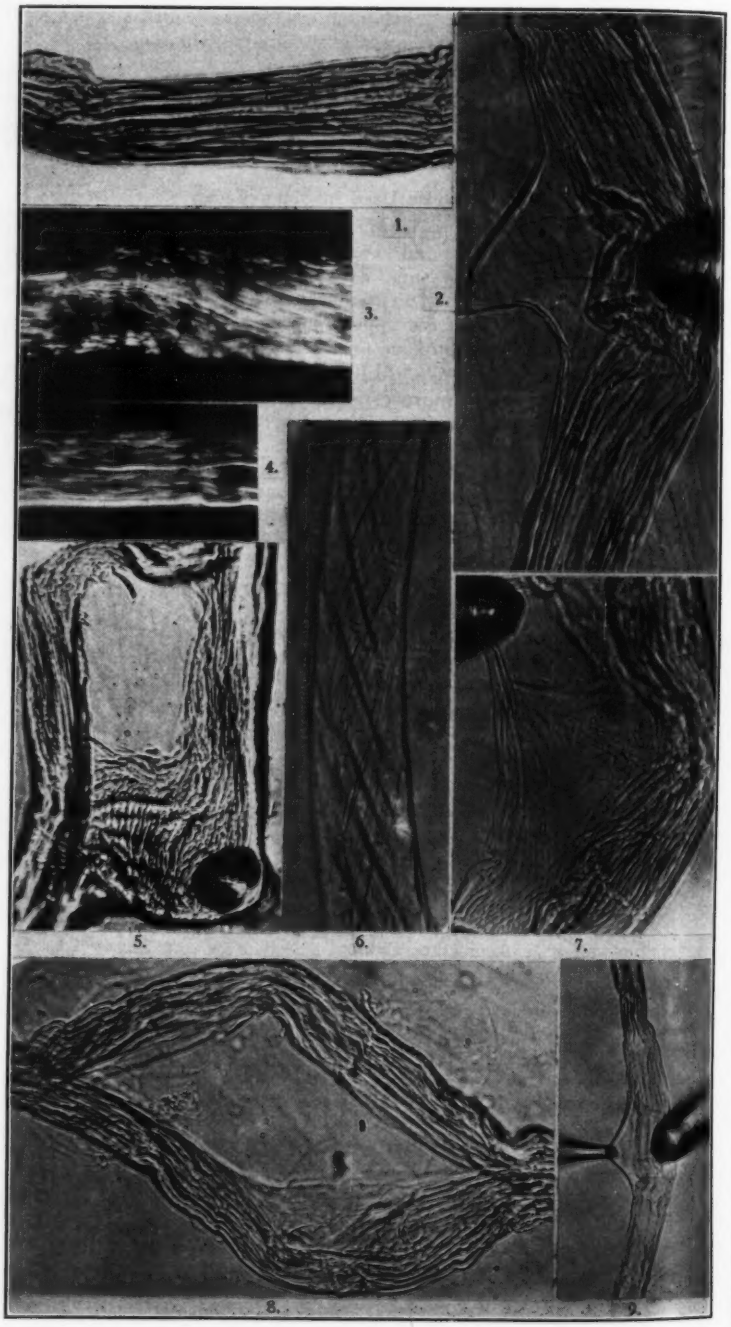

FIG. 1

[1] Botanical Laboratory, University of Pennsylvania, Philadelphia, Pa.

actual strands or fibrils (Fig. 1-1). In dark-field this striated appearance is brought out vividly (Figs. 1-3 and 1.4). The fibers of both beaten and unbeaten pulp show striated or fibrillar structure, though it is much more conspicuous in beaten pulp. If a fiber from beaten pulp is subjected to lateral pressure so as to flatten it, the striae become separated, and stand out as individual strands.

When a fiber is penetrated by two microneedles and the needles moved apart, the fiber is split lengthwise and in such a way that the inner (torn) surface is perfectly smooth (Figs. 1-5 and 1-8). This indicates that the fiber is not a homogeneous mass but consists of linear strands which readily separate when the fiber is torn. If, now, instead of separating a fiber into equal longitudinal parts, one microneedle is made to enter the fiber very close to its edge and then moved away from the other one which is holding the fiber, a single or several fibrils may be lifted off (Figs. 1-2 and 1-9). If movement of the needle is continued the single fibril or group of two or three fibrils may be torn (Fig. 1-2). The diameter of a fibril is estimated at 1.4 μ.

As our work progressed, it became more and more obvious that these fibrils, into which the paper-pulp fiber could so readily be separated, were by no means as fine as the very delicate strands which were frequently to be seen during dissection. Careful micromanipulation revealed that the fibrils are themselves bundles of fine threads, so delicate as to defy individual handling and accurate determinations of their size and number. These secondary fibrils approach the limit of microscopic visibility and produce such conspicuous diffraction lines (in light-field) that their apparent number is increased. The secondary fibrils are estimated to be of the order of 0.1 to 0.3 μ in diameter. When a much beaten fiber is carefully dissected so as to spread out most of the secondary fibrils, the primary fibrils lose their identity and the entire flattened surface of the fiber appears as a sheet of innumerable fine strands (Fig. 2 and Fig. 1-7).

Fiber Like Strand of Rope

The paper-pulp fiber is thus seen to be comparable to a strand of rope, consisting of a bundle of primary fibrils, each one of which is itself a bundle of exceedingly delicate secondary fibrils.

The foregoing behavior holds for both the beaten and the unbeaten pulp except that the unbeaten fibers separate much less readily. Beating loosens up the fibrils so that they may be more readily distinguished. It does not appear that beating brings about any change other than a purely mechanical one; that is to say, while beating certainly loosens up the fibrils, it can not produce them; only fibrous material tears into threads (rope and cloth may be so torn, not clay nor wet sand).

Concerning the constitution of the secondary fibrils we have no evidence. These may, in turn, be built of finer threads, more elementary fibrils, or of shorter units such as micelles, of either microscopic or submicroscopic dimensions. All other evidence indicates that this is probably the case. X-ray analysis confirms and substantiates the structure of the cellulose molecule as postulated by the organic chemists, viz. that it consists of a chain of anhydrous glucose units, the chain reaching dimensions not less than 1000 Angstrom units (0.1 μ). These linear molecules are bundled together forming fascicles or micelles which the chemist generally regards as of submicroscopic dimensions. A micelle may be as long or longer (depending upon arrangement) than the molecular chains which compose it. If the cellulose molecule reaches microscopic size, so will the micelle. Kraemer *(2)* finds, on the basis

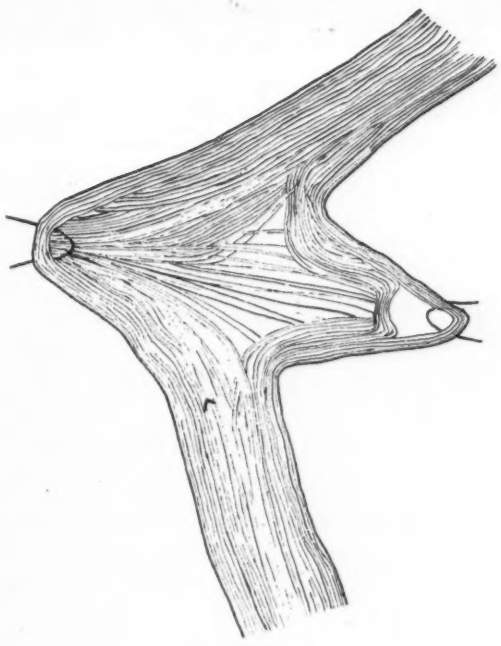

FIG. 2

of viscosity determinations, that the cellulose molecule (and therefore the micelle) may attain the microscopically visible length of 1.7 μ.

X-ray evidence supports the presence of ultramicroscopic size; maceration experiments, (by Ritter *(4, 5)* who has isolated fibril segments several hundred microns long) indicate the presence of microscopic units; dark-field *(8, 10)* and other methods sometimes show the fibrils or striae to be articulate. Thus much evidence lends support to linear units of which the fibrils are built. At times dark-field and polarized light show no articulate structure in the striae or fibrils. The cause of this is suggested in the observations of Meyer and Mark *(3)* that micelles may be bundles of molecules or irregular length or irregularly arranged instead of symmetrical bundles. The former would unite into a continuous fibril while the latter would form an articulate one. This hypothesis is applicable to microscopic as well as submicroscopic units.

Spiral Winding of Fibrils

But it is not with the micelle or other elementary unit that this article deals. We are concerned only with the fibrils which as strands form the pulp fiber. The fiber is thus comparable to a rope or cable and not to a solid rod. It usually possesses a core of lumen, which often contains granular matter suggesting degenerate protoplasm. We found occasional evidence of a spiral winding of the fibrils (Fig. 1-3 and 1-6). When present, it is produced by two planes of fibrils, each arranged in perfect parallelism. The fibers of the one plane cross those of the other at 45 degrees. Scarth *(7)* has pictured spiral twisting in certain wood fibers.

The question of an intervening cementing material is one that has been much investigated and answered in both the affirmative and negative. There is every reason to believe that such a material may exist in wood fibers as trees generally impregnate their tissues with various substances. While microdissection yields no direct evidence to support the presence of a cementing substance in pulp fibers, a

matrix of some sort must fill the interfibrillar spaces and this matrix may act as a cement.

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TAPPI Section Meetings

May 14—Kalamazoo Section meeting at Maple Hills Golf Club, West Main Street, Kalamazoo, Mich. The afternoon will be devoted to golf and tennis followed by dinner at 7:30 P.M. Following dinner there will be shown moving pictures of the St. Lawrence-Saguenay cruise route that TAPPI will take in August. There will be talks on rosin size by a representative of the Paper Makers Chemical Corporation and one on "Casein and its Application in the Sizing of Coated Papers," by W. L. Snyder of the American Cyanamid and Chemical Corporation.

May 15—New England Section meeting at the Hotel Nonotuck, Holyoke, Mass. F. A. Soderberg of the General Dyestuff Company will talk on "The Coloring of Paper."

May 16—Ohio Section joint meeting with the Miami Valley Division of the Superintendents Association at the Manchester Hotel, Middletown, Ohio. R. F. Reed of the Lithographic Technical Foundation, University of Cincinnati will talk on "Recent Developments, in the Technology of Lithographic Papers." Ronald I. Drake of the Champion Paper & Fibre Company, Hamilton, Ohio, will talk on "Problems of the Printer Relative to Paper."

May 22—Delaware Valley Section meeting at the Engineers Club, Philadelphia, Pa. There will be a symposium on Papermaking Fibers and movies will be shown of the Saguenay-St. Lawrence cruise.

M. I. T. Summer Courses

There will be two courses given this summer at the Massachusetts Institute of Technology, Cambridge, Mass., of interest to pulp and paper technical men.

Colloid Chemistry—Five weeks beginning June 16, 1936, under the direction of E. A. Hauser. This course consists of lectures, round table discussions, and laboratory investigations, and is offered the men actively engaged in industry or research organizations. A feature of the course will be lecture-demonstrations by Prof. Harold E. Edgerton on high speed motion picture and stroboscopic measurement technique.

Spectroscopy and Color—The spectroscopy conference will be held on July 20 to 22; the color conference, July 23 to 25; the course in practical spectroscopy June 16 to July 24; and the spectroscopic research June 1 to Sept. 1.

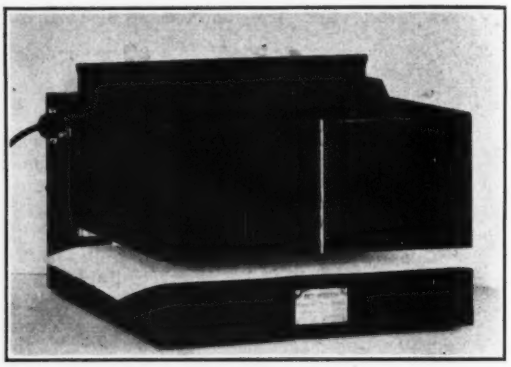
Northwestern Division Not to Meet

C. I. McNair, Jr., secretary-treasurer, announces that while the Northwestern Division of the American Pulp and Paper Mill Superintendents Association planned to meet in Wisconsin Rapids, Wis., May 23, the Spring meeting, owing to the early date of the National Convention which is to be held in Grand Rapids during June, will not be held.

New Fuzz Detector

The Hammermill Paper Company, Erie, Pa., has recently announced the availability of a new testing instrument called a fuzz detector which will readily detect the following surface imperfections and characteristics: fuzzy surface; scuffed surface resulting from deposits on drier rolls; picked surface (often prevalent on papers made from free stock); surface indentations (usually caused by froth or deposits on calender rolls); surface defects resulting from doctors, scored calender or press rolls; rust from drier rolls; streaked surface, due to improper relationship between stock and wire velocities; blackened, blistered or puckered surface; felt seams (sewed sections of felts and wires; and top (felt) and wire sides, direction of grain, disturbance of surface due to erasure, relative surface smoothness or roughness).

The fuzz detector is illuminated by two 100 watt lamps contained in a suitable housing. The source of light is adjustable to permit its direction at the proper angle over the viewing table on which the material to be observed is placed. An adjustable slit is provided between the source of light and the viewing table. Over the viewing table is placed a metal housing designed to eliminate glare and exclude external light, yet permitting the placing of the sample for examination and easy manipulation of the same. The housing is provided with an opening through which the operator views the sample and with a door through which the hand can be inserted to facilitate further inspection and to rub the paper surface to ascertain tendency to fuzz. The instrument is 17 inches long, 15 inches wide, 10 inches high and weighs 28 pounds.



THE FUZZ DETECTOR

The paper sample is placed on the viewing table of the instrument which is 12 x 15 inches in size. The observer views the surface of the sample by looking through the opening at the top of the instrument. In this manner a surface area of 12 x 15 inches in size can be examined without further manipulation, or a strip of paper 12 inches wide and of indefinite length can be inspected by passing it through the instrument. By a single setting of the light source and slit opening, materials of widely varying thicknesses can be examined, such as tissues, bonds and bristols. Materials of ⅛ inch or more in thickness require a slight adjustment of the illuminating device. This can be accomplished in a few seconds. The presently designed instrument will accommodate thicknesses up to one inch.

The price of the fuzz detector as described above is $75 f.o.b. Erie, Pa. Orders should be sent to Hammermill Paper Company. These instruments will be manufactured as orders for them are received and delivery made approximately thirty days after receipt of order.

Some Notes On the Revision Of Methods For Measuring the Strength Of Paper*

By F. T. Carson[1]

During the nine years since their adoption by the Technical Association for the Pulp and Paper Industry the official methods for determining the bursting strength and the tensile properties of paper have occasionally been criticized as inadequate. The Subcommittee on Physical Tests has accordingly undertaken the revision of these methods. The proposed revisions, as submitted, evidence a considerable amount of thought and labor, and the chairman of the subcommittee in particular is to be commended for his assidious efforts. Some of the provisions of these revised methods, however, can scarcely be considered the best that might be chosen for inclusion in standard testing methods. It is proposed to discuss some of these provisions for the purpose of clarifying the issues before the final adoption of revisions of these methods by TAPPI.

I. Tensile Strength and Stretch

The differences between the proposed revision and the present official method for tensile strength are chiefly concerned with the dimensions of the specimen, the rate of testing, and the manner of reporting the results. For the measurement of stretch there is at present no method that has the official sanction of TAPPI.

1. Dimensions of Specimen.

Tensile testing instruments are supplied with either metric or English scales. Accordingly the width of specimen tested is customarily ½ inch, 15 mm., or occasionally 1 inch. The present official method permits the use of any width between ½ and 1 inch, since experience has shown *(4)* that within these limits the tensile strength referred to a unit width is not, in most cases, altered by the width of the specimen by an amount greater than can be attributed to the corresponding change in the rate of loading or to experimental error. The proposed revision recommends restricting the width of the test specimen to a single width, 15 mm., since it is alleged that for a certain type of paper the effect of using different widths is greater than the experimental error. In the testing of most materials the size and shape of the test specimen are definitely fixed because of their effect on the tensile strength value. The restriction to a single, definite width is therefore in line with general practice, although the necessity is not so compelling in the case of paper. A provision for the optional use of other widths between one-half and one inch is in order, however, for less precise testing not involving dispute.

In like manner, and for more manifest reasons, the recommendation of the proposed revision that the length of the specimen be restricted to a single value should be accepted. The evidence *(4, 5)* seems clear that the limits for the length of the specimen afforded by the present official method are much too liberal. The length between clamps should be fixed at some definite convenient value, such as 100 mm. or 180 mm., if metric units are to be used.

2. Rate of Testing.

The present official method defines the rate of testing by specifying the rate of movement of the stressing clamp. Doubtless it was tacitly assumed that the test would be made on a certain type of instrument with a particular range, since otherwise the specification for the testing rate is equivocal. One way of giving it more meaning would be to specify the instrument more definitely. The usual type of tensile tester is provided with two pendulum bobs of different weight, and two scales to correspond. It is possible to test weak papers on either scale, the testing rate being five or six times greater in one case than in the other. The present official method attempts to partially remedy this condition by confining tests to that part of the scale between 10 and 90 per cent of the capacity, so that only rarely will it be possible to test a paper on either scale. The A.S.T.M. method for textiles contains a somewhat similar provision stated in terms of the minimum and maximum allowable angular displacement of the pendulum. Since there is evidence *(2, 5)* that paper seems stronger when broken quickly than when broken slowly, it is desirable to specify the rate of testing in a more definite manner. There are at least three obvious ways in which the rate of testing might be defined. It might be required that (a) the rate of stretching the specimen be constant, or (b) the rate of loading the specimen be constant, or (c) the time to failure of the specimen be constant. The proposed revision recommends a modified form of (c). This is the most objectionable recommendation in the proposed revision. It is proposed that the rate of movement of the stressing clamp be so regulated that every specimen of whatever nature shall be broken in from 10 to 30 seconds from the beginning of the loading, and that in case of doubt or controversy the specimens shall be broken in 20 seconds or as near thereto as possible. Although this might work out fairly well under circumstances where only certain kinds of paper are being tested, and when one knows beforehand about what the breaking load will be, and when there are few disputed cases, it would be very annoying to apply this proposal to a general reference standard for all kinds of paper. Failure of the specimen at 20 seconds after the beginning of the loading is of course required as the ultimate standard, for the disputed cases, and one who has not tried to accomplish this feat on a tensile tester can little appreciate the difficulty involved. Since one must know beforehand what the breaking load will be, preliminary tests must be made. Then after the adjustment of the speed of the tester (in the design of which no means have been provided for varying the speed at will) one or more additional preliminary tests must be made until the 20-second breaking interval is attained. This process must be repeated each time a new sample is tested. It does not reduce the annoyance in referee testing to point out that for most practical purposes a limit of 10 to 30 seconds in the time to failure will prove satisfactory, and that within this limit two-thirds of either scale of the usual type of tensile tester can be used without altering the speed of the stressing clamp.

At this point it will be well to discuss briefly the scope of the standard testing methods of TAPPI. Unfortunately we do not find any statement on this point in the literature of the association. It seems generally understood, however that these methods are to function primarily as consumer reference standards. Secondarily they are avail-

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*Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 17 to 20, 1936.

[1] National Bureau of Standards, Washington, D. C.

able as accurate, reproducible methods for research and general testing. It is not contemplated that those features necessary to make them suitable for their chief functions are to be sacrificed in order to make them suitable for control testing. An effort is made, however, to make the standard methods as simple and usable as is compatible with the chief purposes of the methods so that they may be valuable also in the paper mill. In considering the content of a proposed standard it is necessary to apply frequently the above criteria. Time saving features, for example, are desirable but not necessary in a standard method. In the mill rapid tests are essential. Annoying details when essential to the accuracy and reproducibility of the methods must be tolerated, but when not essential they restrict the usefulness of the standard methods.

In considering the proposed means of specifying the rate of testing in the tensile test, we are not to condemn the proposal merely because it contains features that would make the method very annoying as a general reference standard, but we should inquire if there is not some other means of specifying the rate of testing that will accomplish the ends equally well or better without introducing the objectionable features.

Since in the rate of slipping and disentangling of the matted fibers is found the most likely reason for the effect of the rate of testing in the tensile test, the ideal way of defining the rate of testing would be to require every specimen tested to be stretched or deformed at the same constant rate. If we had a tensile tester in which we could clamp one end of the specimen in a stationary clamp and the other in a clamp that moves at a uniform, constant rate, and we could accurately measure the load applied and the corresponding elongation at any time, we should have a very much better tensile test than we can obtain with the equipment commonly used. As a matter of fact, however, we have no such paper testing instrument. The pendulum-type tester, in which both clamps move, is almost universally used for determining the tensile strength of paper. With such an instrument it is not feasible to stretch at a given rate all papers of whatever character. We have the necessity, therefore, of defining the rate of testing in a manner that can be applied to the type of instrument in common use in connection with specifications and contracts.

The remaining alternative, among those enumerated, is to define the rate of testing by requiring the specimen to be loaded at a constant rate. Since this is the goal aimed at in the testing of most other materials, it seems odd that this was not given first consideration. Although the design of the pendulum-type tensile tester does not permit of a really constant rate of loading, the rate of loading corresponding to a given scale and a given speed of the stressing clamp will be substantially constant if the angular displacement of the pendulum is not too great and if the stretch of the material tested is small. Since the maximum stretch of paper is usually less than 5 per cent, the design of the pendulum-type instrument commonly used in paper testing favors this manner of defining the testing rate, provided we allow a sufficient tolerance to take care of the sine scale and the difference in stretch of different papers. This means of defining the rate departs less from the existing standard than does the proposed means, and accomplishes the desired ends in a more satisfactory manner. It probably approaches nearer the ideal of a constant rate of stretching also, since for a given type of paper the stretch is likely to vary somewhat in proportion to the strength, although this is not necessarily true. This solution of the difficulty, while leaving much to be desired, seems to be the best that can be done with the present type of testing instrument.

By way of illustration, suppose we define the rate of testing by requiring that the specimen shall be loaded at the rate of 2 pounds ± 20 per cent per inch width per second (approximately half a kilogram per second for a specimen 15 mm. wide). Referring the rate to a unit width of specimen insures a constant rate of stretching for a given material regardless of the width actually tested. It will be sufficient simply to time the midscale reading. If, for example, one is to test specimens half an inch wide on an instrument having the two scales graduated from 0 to 14 pounds and 0 to 70 pounds, one chooses a ratio of driving pulleys that will bring the pointer to midscale of the 14-pound scale in about 7 seconds. For testing with the 70-pound scale, on which midscale reading should be attained in about 35 seconds, the reduction of the speed of the motor with a suitably wire resistance and double-throw switch is the simplest method. Once the driving speed is adjusted to give the proper testing rate for a given instrument and width of specimen, no further attention to this detail is necessary except to throw the switch when one changes from one scale to the other, no matter what part of either scale is to be used. With this arrangement the return of the stressing clamp can be made at the higher speed in all cases. No preliminary tests are necessary to determine the probable breaking load. The actual timing of each test is no longer necessary. The difficulty due to the effect of the rate of testing is entirely eliminated, in that every laboratory using this means of specifying the rate of testing should reach the breaking load for a given sample in the same time. This accomplishes equally well the purpose of the proposed revision, and does it in a much simpler manner.

As indicated by the recent data of Griffin *(3)*, tests made on the two scales with the same rate of travel of the stressing clamp yield results that seldom differ by more than 5 per cent. In fact the data presented by Clark *(2)* to show how well different laboratories agree when using the proposed revision reveal differences considerably in excess of this amount. An uncertainty of this amount is not significant in most applications of paper. For most testing, therefore, it would be unnecessary even to throw the switch. Except for tests involving dispute or tests made in connection with some research problems, the procedure in respect to the rate of testing need be no different from that provided in the existing standard except for the once-for-all adjustment of the operating speed so that the midscale reading on the smaller scale will be reached in the time corresponding to the chosen loading rate of so many pounds or kilograms per second per unit width.

For tissues and very weak papers special tensile testers are provided that are graduated in grams or fractions of an ounce. It might be found that loading with such testers at the rate of a pound per second (for a half inch width of specimen) would be so rapid that the inertia of the pendulum would be significant. If such should be the case, the simplest solution is to place such papers in a separate category, as they in fact are, and specify a slower rate of testing for such papers. Likewise, special tensile testers are provided for boards that must be loaded to several hundred pounds, and a faster rate of loading could be specified for such materials, if desired. There is no magic in a particular rate of testing, or in a particular time to failure. It is only necessary that materials whose strength is to be compared should be treated in a comparable manner while being tested.

It is felt that, if the rate of testing is defined in the simpler manner in terms of the rate of loading, the standard method is more likely to be used and adhered to than if it is defined as recommended in the proposed revision.

3. REPORT.

The nomenclature of the revision is slightly different from that of the present standard. The property measured is designated as the tensile strength instead of the breaking strength, and is probably not objectionable if the meaning is clearly understood. The older term, breaking strength, has been used to distinguish the usage in paper testing from the more common concept of tensile strength. The strength of paper is expressed in terms of the load per unit width and not in terms of the load per unit cross section. It is noted, however, that tensile strength in the sense of breaking load per unit width is in good standing in A.S.T.M. methods. In keeping with this terminology the revision should clearly indicate that any convenient set of units is acceptable and that tensile strength of paper may be expressed as pounds per inch width, kilograms per centimeter width, etc. It seems unreasonable to require the report to give the tensile strength in the awkward unit, kilograms per 15 mm., leaving the implication that the test would not conform to the standard method if the report is made in any other way. This criticism applies to the existing standard as well as the revision.

4. STRETCH.

The elongation of paper is an important property and deserves more consideration than is commonly accorded it. Perhaps one reason that the measurement of the elongation has not had much place in paper testing in the United States is that the method commonly used for determining elongation, an adjunct of the pendulum-type tensile tester, does not inspire much confidence in the accuracy of the measurement. We always get a set of figures, of course, but there is usually some failure of the mechanism to respond instantly, some uncertainty in the adjustment, an increase of the reading as a result of vibration, or some source of uncertainty as to whether elongation is really measured. In the data *(2)* showing that elongation tests made in different laboratories might agree within 20 per cent, it is noted that nearly half the results were not included in the calculation. Until we have a method that merits greater confidence, it would probably be best to place the available method in the newly created category of suggested methods of TAPPI. The remarks under the discussion of tensile strength in regard to rate of testing apply also to the measurement of stretch.

II. Bursting Strength

The official standard for determining the bursting strength of paper has for several years been in need of revision. It contains, for example, two important provisions that do not conform to the generally accepted manner of making the test, and a third that is ambiguous. The intent of the provisions is taken for granted and the industry makes use of the method according to the spirit rather than the letter of the provisions, while awaiting a long deferred revision. The revision now proposed only partially corrects these deficiencies, and adds other provisions that seem unwise to adopt. Basing the standard method on the unfamiliar Schopper-Dalen instrument, as the proposed revision would do, is unwise in the nature of the case. Although this instrument builds up the pressure at a more uniform rate and is said to give values different from those obtained with the familiar hydraulic type, these facts alone are not evidence that the former values are in any sense more correct than the latter. Bursting strength, unlike tensile strength, is not a simple property. It is a good illustration of defining paper in terms of a particular kind of apparatus. Since bursting strength can scarcely be divorced from the particular kind of testing instrument, and since it has been determined in this country for decades with the hydraulic-type of instrument, and is probably in more purchase specifications than any other one test, it would be unwise to base the standard on an unfamiliar instrument of different type. The difficulties that are alleged to be inherent in the hydraulic type will probably largely disappear if the rate of testing is not too great and if the gages are properly adjusted and are calibrated in a manner that simulates operating conditions.

The provision in the present official standard of a 1.24-inch orifice is not in conformity with the facts of history. The old rubber clamping rings, having this nominal inside diameter, closed up under clamping pressure to an effective diameter of about 1.20. For several years the most common type of bursting tester has been furnished with a metal clamping ring having a 1.20-inch orifice, and the data obtained therewith are in substantial agreement with those obtained with the rubber clamping ring *(1)*. The standard should be altered to provide for a 1.20-inch orifice. The proposed revision specifies an orifice with rounded edges having a maximum diameter of 1.25 inches. The use of such an orifice would give slightly lower results than are obtained at present. For those rare cases of shear at the boundary, it is sufficient to merely relieve the sharpness without appreciably altering the diameter, according to Oliver *(5)*.

The official standard specifies that pressure shall be applied at a uniform rate. No bursting tester of the hydraulic type is ever operated in this manner. The pressure as registered by gage is applied with an accelerated rate, as is evidenced by the fact that the needle moves slowly at first and then more and more rapidly as the pressure builds up. This behavior seems to be a necessary consequence of expanding a flat sheet into a segment of a sphere by displacing liquid into the chamber at a uniform rate. It is clear from the context that what was intended was to specify a uniform rate of influx of the liquid pressure medium. Either the wording should be altered to conform to the fact, or the design of the instrument should be altered to provide for a uniformly increasing pressure. A proper design of the actuating cam would accomplish the latter (on the motor-driven models).

The official method does not specify the rate of applying the load in the calibration of the gages. It is very important that the pressure be applied in calibrating the gages at about the same rate that it is to be applied during a bursting test. This automatically takes care of the effect of the inertia of the mechanism.

The slowing down of the bursting test, as recommended in the proposed revision is probably a desirable change. It will probably lead to slightly lower values than are now obtained, but the gain in the long run should be considerable, in that it should facilitate the maintenance of gages and increase their accuracy. The treatment accorded a pressure gage in a bursting test is very severe, and the gages will perform better if the testing rate is reduced to an elapsed time of 2 seconds more or less. This is about half as fast as the present official standard provides for. It would be impractical to designate a definite time to failure, as it would be necessary to alter the driving speed for each sample, which would lead to the same sort of difficulties as specifying a constant time to failure in the tensile test. The simplest way is perhaps to specify that a pressure between 50 and 60 pounds per square inch shall be attained in 2 seconds from the instant pressure begins to register on the gage.

In the proposed revision it is unnecessary to specify the depth of tool marks in the clamping surfaces, since grooved surfaces are not superior to substantially plane surfaces in holding the paper from slipping *(6)*.

Under "Report" it should be noted that the results are to be reported as bursting pressure in pounds per square inch (not bursting strength). Bursting strength is not referred to a cross section of the material, as would inevitably be assumed if the strength were reported in pounds per square inch. Confusion is likely to follow if the results are reported as recommended.

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Refining Action of Discs*

By D. Manson Sutherland, Jr.[1]

Abstract

1. The mechanics of beater and jordan tackle can be incorporated in discs.

2. Centrifugal force can be more effectively used in discs and cells or grooves can be designed to do actual work on the fibers.

3. Progress has been made during the past year in applying these mechanical factors to discs on a commercial scale for high yield sulphite.

4. Further studies are necessary to develop formulae for design of discs so as to accurately predetermine the outgoing stuff properties, capacity and power consumption.

History

The records of patent offices in prominent papermaking countries show that disc refiners have occupied the thoughts of inventors for a long time. Among the earliest was L. G. Stuart, who was granted a British patent No. 2828 (November 29th, 1856) covering a single rotating disc equipped with knives. On February 4, 1887 a British patent No. 1808 was granted to H. H. Lake for the use of a disc in conjunction with a cone. Oppositely rotating stone discs was mentioned in specification of British patent No. 15,105 granted to B. Jirotka (June 28, 1911). Stone discs rotating in the same direction, but at different speeds was patented by John J. Foley in the United States on October 30, 1900. These patents do not cover the field by any means, but are mentioned to show that the use of discs for pulp refining is old. In some cases these early inventors were practical papermakers who were apparently trying to develop machines and processes which would be faster and more economical than those existing at the time.

Despite all efforts to develop disc refiners it is significant that none have found an important place in papermaking in comparison with beaters and jordans. This is, perhaps, more surprising when it is realized that it is quite possible to incorporate all of the mechanics of beating and jordaning tackle into discs.

Mechanics of Beating Tackle

The term "Mechanics of Beating Tackle" is taken from "The Action of the Beater" by Dr. Sigurd Smith and published by the Technical Section of the Papermakers Association of Great Britain and Ireland (1923). The Mechanical factors are as follows:

1. Length of bars.
2. Width of bars.
3. Angle of bars.
4. Width and depth of cells.
5. Speed of rotation.
6. Pressure between bars.
7. Weight of beater roll, shaft, and pulley.

From these factors the following data is calculated:

A. Meter cuts per second, corresponding to inch cuts per minute or impact inches per minute.

B. Beating surface per second of the beater, corresponding to contact area per minute.

C. Beating pressure.

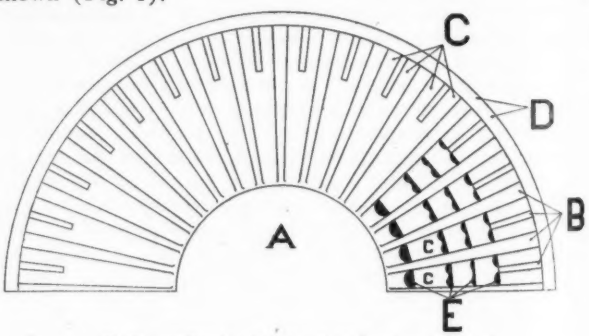
The mechanics of jordans are similar except that the weight of the plug does not enter into the factor of pressure as the weight of a roll does in beating. For the purposes of comparison with disc refining the mechanics of beater and jordan tackle are combined although the refining action of each type is generally considered to be different.

Studies of discs used in the prior art show the use of stones, iron, bronze, steel bars, and plates of glass or porcelain. The design of grooves varied a great deal in size and number and no general design was arrived at. Various speeds ranging from 85 to 3600 r.p.m. have been used although the higher ranges of speeds have only been used on the modern attrition mill type of disc refiner. Investigation of the prior art used in disc refiners does not offer much help to anyone interested in the developsent of this particular type of refiner. Consequently, it has been necessary to carry on tests over a period of five years in order to obtain data for use in the design of efficient discs.

Discs have been made of stone, bronze, and stainless steel. Approximately twenty-five designs have been used with speeds ranging from 630 to 860 r.p.m. Some details of tests on discs refining were covered by the author in "Preliminary Notes on Continuous Refining" published in Technical Association Papers 1934, page 200, and this paper is intended to give a further progress report since that time together with details of the "Mechanics of Discs Tackle."

Mechanics of Disc Design

In order to explain the mechanics of discs design in the light of present experience a section of a typical disc is shown (Fig. 1).



(U. S. and Foreign Patents allowed and applied for)

FIG. 1

A. Represents the inlet zone. B. Bars. C. Grooves. D. Check ring. E. Section through grooves.

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 17 to 20, 1936.

[1] Member TAPPI, Consulting Engineer, Broad Street National Bank Building, Trenton, N. J.

The inlet zone A varies in size from 8 to 14 inches, according to the capacity of the unit. Bars B may be radial from the center and sufficient number are employed to obtain inch cuts or impact inches required for a given stuff and capacity. Grooves C are designed to permit the flow of pulp between the discs in a definite quantity. Check ring D controls the outward flow of pulp according to the gap between the discs. The mechanics of discs design include the following factors:

1. Impact inches or inch cuts per minute.
2. Contact area.
3. Width of bars.
4. Angle of bars.
5. Width and depth of grooves (cells).
6. Speed of rotation.

The above factors are comparable with the data used in mechanics of beater and jordan tackle. In addition to the above it is necessary to include further factors in the design of discs for a definite stuff, sheet properties and capacity as follows:

7. Outlet diameter.
8. Width of grooves.
10. Inlet area of grooves.
11. Discharge area.
12. Amount of pulp held between discs.
13. Rate of flow between discs.
14. Amount of stuff produced per sq. in. of area of discs per hour.
15. Pressure between discs.

In Dr. Smith's book referred to above "The Beating Pressure" is discussed in Chapter 4 and The Influence

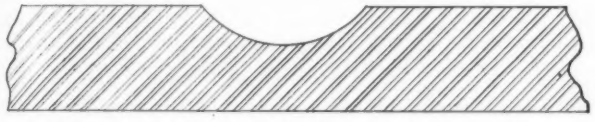


FIG. 2

of Pressure and Consistency on the beating action in Chapter V. In like manner the effects of pressure and consistency of pulp between discs is equally important but in the case of disc refining as applied to a continuous refining system, it is also necessary to take into consideration the incoming pulp. Great differences have been noted in the feeding properties of sulphate, sulphite, soda and ground wood screenings. Naturally, short fibers such as soda, feed easily, whereas ground wood screenings containing stiff and rigid wood bundles of large size do not feed so readily consequently it is necessary to design the inlet grooves accordingly. The facts to be noted are:

A. Maximum particle size.
B. Freeness.

These factors in turn control the design of the inlet to grooves C.

The pressure between discs has not been definitely measured and mathematical calculations only have been used.

During the past year particular attention has been paid to the relation between speed and the other factors mentioned. This work has shown that one disc stationary and one rotating at a given speed is much more economical

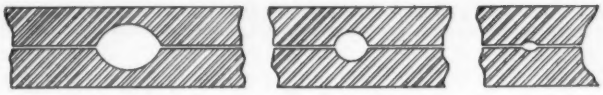


FIG. 3

on power as compared with both discs running oppositely at the same speed. The reduction in capacity with single rotation is approximately 20 per cent without any reduction in work done on fibers. This reduction in power reduces the increase in temperature of the stuff being refined by about one-half compared with double rotation.

Application of Design

Taking all these factors into consideration, we can proceed to incorporate the same into discs for a given refining job. As an example, we can take high yield sulphite which has been commercially produced for newsprint for over one year by discs.

Incoming raw sulphite	
Maximum particle size (chips)	¾ inch
Freeness (Canadian) average of fines	700 cc.
Strength ratio	90
Refined sulphite	
Freeness (Canadian)	600 cc.
Freeness drop	100 cc.
Strength ratio	120
Capacity of discs	100 ton a.d. per 24 hours
Power consumption	1.2 h.p. per ton per day
Description of discs	
Single rotation speed	860 r.p.m.
Outlet diameter	29 inches
Inlet diameter	14 inches
Contact area per minute	29,000,000 square inches
Width of face	7.5 inches
Impact inches (in. cuts) per minute	14,500,000 inches
Volume of grooves	94 cubic inches
Inlet area	23 square inches
Outlet area	2.85 square inches
Amount of pulp suspension held between discs at 3 per cent consistencies	3.4 pounds
Rate of flow of pulp suspension between discs	77.07 pounds per second
Amount of stuff produced at 3 per cent consistency per square inch of area of discs per hour	16 pounds
Pressure (estimated)	6 pounds per square inch of contact area

The refined sulphite is screened in the usual manner, mixed with screened ground wood and then run over the paper machine. This use of disc refining enables the yield of sulphite to be raised from approximately 48 to 60 per cent. The freeness and strength is held quite uniform and classification of the refined sulphite fibers shows very little variation over long periods.

The disc design shown (Fig. 1) is classified as a rubbing disc since it is designed to rub the chips and shives with minimum reduction in freeness or fiber length. In order to obtain low freeness with some cutting, it is necessary to vary the factors accordingly. The impact inches, contact area, pressure and power consumption will go up, but the capacity will go down because the rate of flow must be lowered to permit more refining action in one pass.

Special Features of Design

The design of discs used in these tests have features which are not found in the prior art or in beaters or jordans. The cells (channels, spaces, etc.) between bars

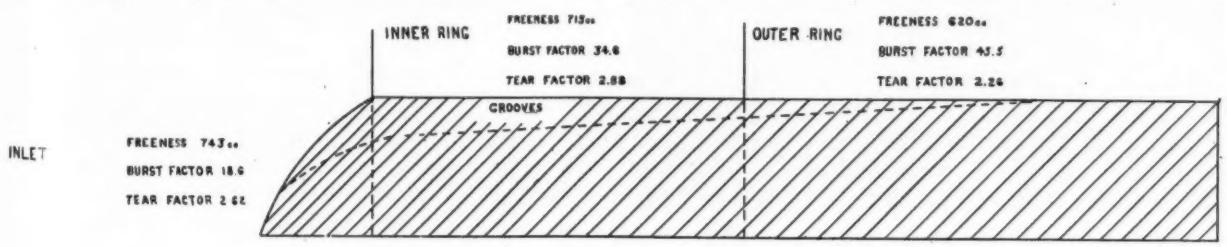


FIG. 4

in the latter types are used to obtain circulation and are rectangular in shape consequently no refining action, to speak of, is done in the cells. All the work is done either at the edge of the bar or on the flat or contact surface of the bar or both. Tests have shown that the grooves can be made to do work and this factor is used to advantage in disc refining. The same factor can be applied to cones (jordan) as well as discs but cannot be applied as well to beaters owing to the need of circulation between the roll and the bedplate.

Centrifugal force due to speed drives the pulp between the discs and when properly designed keeps the grooves full. This advantage can be utilized in discs or cones by making the grooves arcual in shape as shown in Fig. 2.

Furthermore, the centrifugal forces increase toward the periphery, consequently the velocity of the pulp tends to increase. This tendency is checked by making the actual grooves more shallow towards the periphery as show in Fig. 3, thus steadily decreasing area and volume of grooves, by this means the grooves are made to do effective work in rubbing, rolling, and squeezing the fibers.

To obtain the highest efficiency, disc refiners must operate on a constant head and with an available supply of pulp greater than the discharge thereby keeping the grooves constantly filled with pulp.

Mechanical feeding devices are not satisfactory owing to the difficulty of regulating the feeding mechanism to the exact requirements of the discs. This is particularly true when uniform stuff properties are essential over a long period of time.

Effects of Disc Design

The importance of properly designed grooves is shown by commercial tests made in 1932 on the same refiner which produced the results given above for high yield sulphite in 1934.

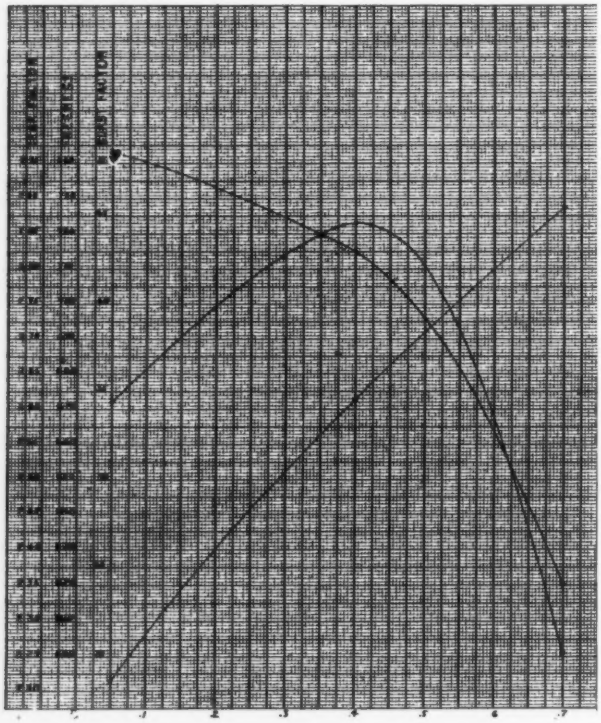


FIG. 5
Refining time in fraction of seconds.

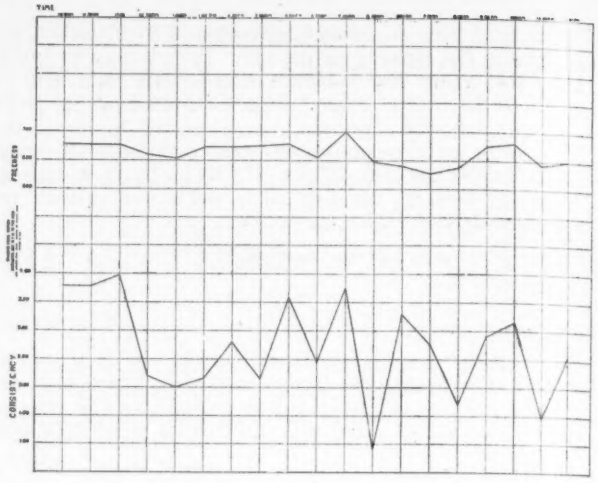


FIG. 6

	1932	1934
Raw material	Bleached sulphite	High yield sulphite
Incoming freeness	620 green	700 Canadian
Outgoing freeness	465 cc.	600 cc.
Freeness drop	155 cc.	100 cc.
Capacity	29 tons	100 tons
H.p. per ton per day	19	1.2
Outside diameter of disc	34 inches	29 inches

The above tests are not strictly comparable but the lower capacity and higher power in 1932 cannot be attributed to the greater freeness drop but to the disc design.

Refining Action of Discs

In order to develop efficient discs, laboratory tests have been made to ascertain the strength development and freeness drop across the face of the disc. A section of the disc is shown to indicate the testing zones. (Fig. 4).

In our laboratory refiner the average fill and empty time of discs is 0.955 times per second and the quantity of pulp and water between the discs is carefully removed in the two rings shown in Fig. 4. Fig. 5 shows the results obtained.

In view of the short period of time that the stuff is between the discs it is rather surprising to note the results. The inner ring develops strength without material change in freeness thus imitating the action of gentle beating whereas the outer ring develops additional bursting and freeness drop similar to the action of a jordan.

Tests have been made on a commercial refiner to check the effect of variations in consistency on freeness. The furnish was high yield sulphite and the head and pressure on the discs remained constant. (Fig. 6).

Apparently properly designed discs eliminate the effect of variations in consistency to a large extent. Investigations of this important phenomenon involves complicated theories concerning the flow of fiber bundles and discreet fibers in water through orifices. Some dewatering occurs apparently but further studies will be necessary before any definite explanation can be made.

The mechanics of disc design can be applied so that no appreciable reduction in fiber length is obtained. A refining action of this type is particularly advantageous on pulps which have a short fiber such as soda and old papers. In order to avoid cutting, it is necessary to reduce the impact inches or inch cuts and depend more upon the contact area to rub the fibers. Higher pressures on the discs are required also owing to the small particle size of the soda fibers. A typical test is shown:

Test	Freeness Green	On 20	On 35	On 65	On 150	Through 150	Coarseness
Raw soda pulp	520	3.3	37.9	32.0	12.8	14.0	0.92
Refined soda pulp	330	1.3	40.0	32.9	11.5	14.3	0.93

IMPORTS OF PAPER AND PAPER STOCK

NEW YORK, BOSTON, PHILADELPHIA AND OTHER PORTS

NEW YORK IMPORTS

WEEK ENDING MAY 2, 1936

CIGARETTE PAPER

H. J. Strauss, *Pipestone County,* Bordeaux, 267 cs.; H. J. Strauss, *Champlain,* Havre, 103 cs.; Champagne Paper Corp., *Champlain,* Havre, 446 cs.

WALL PAPER

———, *Europa,* Bremen, 9 cs.

NEWSPRINT

Jay Madden Corp., *Scanmail,* Kotka, 853 rolls; Lunham & Reeve, Inc., *Scanmail,* Kotka, 229 rolls; Jay Madden Corp., *Washington,* Hamburg, 98 rolls; Jay Madden Corp., *Hamburg,* Bremen, 134 rolls; Perkins Goodwin & Co., *Hamburg,* Hamburg, 380 rolls; H. G. Craig Co., *Donpaco,* Donnacona, 332 rolls.

PRINTING PAPER

Keller Dorian Paper Co., *Excambion,* Marseilles, 8 cs.; Steiner Paper Corp., *Hamburg,* Bremen, 22 cs.

WRAPPING PAPER

———, *Hamburg,* Bremen, 40 bls., 9 cs.

FILTER PAPER

H. Reeve Angel & Co. Inc., *American Banker,* London, 3 cs.; C. Schleicher & Schull Co. Inc., *Hamburg,* Hamburg, 10 cs.

FILTER MASSE

A. Giese & Son, *Hamburg,* Hamburg, 5 bls.

SURFACE COATED PAPER

Gevaert Co. of America, *Pennland,* Antwerp, 81 cs.; Hensel Bruckman & Lorbacher, *Hamburg,* Hamburg, 10 cs.

PHOTO PAPER

American Express Co., *Hamburg,* Hamburg, 43 cs.

TRANSFER PICTURES

Rohner Gehrig & Co., *Europa,* Bremen, 6 cs.

COLORED PAPER

———, *Europa,* Bremen, 5 cs.; International F'd'g Co., *Hamburg,* Hamburg, 14 cs.

TISSUE PAPER

F. C. Strype, *Carinthia,* Liverpool, 6 cs.; W. J. Byrnes, *Britannic,* Southampton, 1 cs.

BOWL PAPER

Hurley Johnson Corp., *Carinthia,* Liverpool, 48 bls.

TRACING PAPER

Titan Shipping Co., *Hamburg,* Bremen, 10 cs.

CARD BOARD

American Express Co., *Hamburg,* Hamburg, 50 cs.

PAPER TUBES

———, *Hamburg,* Hamburg, 65 pkgs.

PASTE BOARD

———, *Hamburg,* Hamburg, 42 bls.

MISCELLANEOUS PAPER

Favor Ruhl Co., *Champlain,* Havre, 3 cs.; Standard Products Corp., *Champlain,* Havre, 8 cs.; ———, *Hamburg,* Hamburg, 316 rolls; A. Brown & Bro., *Hamburg,* Hamburg, 6 cs.; W. Bersch, *Hamburg,* Hamburg, 3 cs.

RAGS, BAGGING, ETC.

E. J. Keller Co. Inc., *Tonsbergfjord,* ———, 216 bls. rags; Chase National Bank, *Tonsbergfjord,* Barcelona, 142 bls. rags; Bank of N. Y. Trust Co., *Tonsbergfjord,* Barcelona, 79 bls. dark cottons, 53 bls. tares, 33 bls. bagging; ———, *Tonsbergfjord,* Barcelona, 100 bls. bagging; ———, *Exchange,* Izmir, 232 bls. rags; ———, *Examiner,* Algiers, 138 bls. rags; E. J. Keller Co. Inc., *Examiner,* ———, 198 bls. rags; Manufacturers Trust Co., *Kinai Maru,* Shanghai, 300 bls. cotton waste; ———, *Pennland,* Antwerp, 226 bls. bagging; Chase National Bank, *Pennland,* Antwerp, 92 bls. rags; W. Steck & Co., *Excambion,* Alexandria, 33 bls. rags; P. Berlowitz, *Excambion,* Alexandria, 110 bls. rags; Banco Coml Italiane Trust Co., *Excambion,* Alexandria, 135 bls. rags, 37 bls. bagging; E. J. Keller Co. Inc., *Excambion,* ———, 343 bls. rags; E. J. Keller Co. Inc., *Motomar,* ———, 76 bls. old cottons; Darmstadt Scott & Courtney, *Motomar,* Barcelona, 136 bls. rags; S. Shapiro & Son, *Motomar,* Barcelona, 96 bls. rags; ———, *Motomar,* Barcelona, 258 bls. rags, 72 bls. bagging; S. Shapiro & Son, *Scanmail,* Gdynia, 250 bls. rags; G. W. Millar & Co. Inc., *Pipestone County,* St. Nazaire, 109 bls. bagging, 38 bls. linseys; G. W. Millar & Co. Inc., *Pipestone County,* St. Nazaire, 387 bls. rags, 127 bls. old cotton; R. Blank, *Pipestone County,* St. Nazaire, 43 bls. rags; R. Blank, *Pipestone County,* Bordeaux, 268 bls. rags; E. J. Keller Co. Inc., *Pipestone County,* ———, 115 bls. bagging, 1067 bls. rags; ———, *Liberty,* Leith, 164 bls. bagging; Castle & Overton, Inc., *Liberty,* Dundee, 382 bls. paper stock; Philadelphia National Bank, *Hamburg,* Hamburg, 187 bls. rags; Royal Manfg Co., *Montreal Maru,* Kobe, 100 bls. cotton waste; E. A. Stone Co., *Montreal Maru,* Kobe, 175 bls. cotton waste; O'Brien Padawer Co., *Montreal Maru,* Kobe, 85 bls. cotton waste; O. Smith & Son, *Montreal Maru,* Kobe, 150 bls. cotton waste; New England Waste Co., *Montreal Maru,* Taku Bar, 100 bls. pickers; Royal Manfg Co., *Montreal Maru,* Shanghai, 200 bls. cotton waste; Boger Cotton Products Co., *Montreal Maru,* Shanghai, 100 bls.

cotton waste; W. Garretson, *Montreal Maru,* Shanghai, 103 bls. bagging.

GLUE STOCK

———, *Carinthia,* Liverpool, 568 bags hide cuttings; ———, *Hamburg,* Hamburg, 500 bags bone glue.

OLD ROPE

———, *Examiner,* Algiers, 49 bls.

CASEIN

T. M. Duche & Sons, *Western Prince,* Buenos Ayres, 834 bags; ———, *Canadian Planter,* Auckland, 322 bags ———, *Hamburg,* Hamburg, 134 bags.

WOOD PULP

Gottesman & Co. Inc.; *Lucia C.,* Roumania, 1015 bls. wood pulp; ———, *Lucia C.,* Trieste, 671 bls. wood pulp; Lagerloef Trading Co., *Scanmail,* Kotka, 5250 bls. sulphite 1050 tons; ———, *Washington,* Hamburg, 102 bls. wood pulp, 10 tons; Bank of N. Y. Trust Co., *Hamburg,* Hamburg, 605 bls. wood pulp, 121 tons; Castle & Overton, Inc., *Hamburg,* Hamburg, 250 bls. wood pulp, 50 tons; G. H. MacFadden & Bro., *Hamburg,* Hamburg, 700 bls. wood pulp, 140 tons.

WOOD PULP BOARDS

G. H. MacFadden & Bro., *Norden,* Hamburg, 140 bls.; J. Madden Corp., *Scanmail,* Kotka, 11 bdls., 130 bls.

WOOD PULP SHEETS

———, *Hamburg, Bremen,* 70 bls.

BOSTON IMPORTS

WEEK ENDING MAY 2, 1936

———, *Lucia C.,* Trieste, 1005 bls. wood pulp; ———, *Lucia C.,* Trieste, 100 bags hide glue; ———, *Carinthia,* Liverpool, 500 bags casein; ———, *Carinthia,* Liverpool, 574 bags hide cuttings; Oxford University Press, *Carinthia,* Liverpool, 11 cs. printing paper; F. S. Webster Co., *Carinthia,* Liverpool, 19 cs. tissue paper; G. F. Malcolm Co., *Carinthia,* Liverpool, 13 cs. tissue paper; E. J. Keller Co. Inc., *Excambion,* ———, 65 bls. rags; J. T. Flannery, *Excambion,* Alexandria, 40 bls. rags; Ayres W. C. Jones Co., *Montreal Maru,* Shanghai, 50 bls. cotton waste; New England Waste Co., *Montreal Maru,* Shanghai, 61 bls. cotton waste; Philadelphia National Bank, *Montreal Maru,* Kobe, 425 bls. rags; Gottesman & Co. Inc., *Liberty,* Czecho-Slovakia, 700 bls. wood pulp.

PHILADELPHIA IMPORTS

WEEK ENDING MAY 2, 1936

———, *Lucia C.,* Trieste, 168 bls. wood pulp; ———, *Examiner,* Algiers, 45 bls. rags; Lagerloef Trading Co., *Scanmail,* Kotka, 2032 bls. sulphite, 399 tons; J. W. Hampton Jr. Co., *Scanmail,* Kotka, 407 rolls newsprint; Lagerloef Trading Co., *Scanmail,* Kotka, 919 bls. wood pulp boards; R. Blank, *Pipestone County,* Havre, 168 bls. rags; Castle & Overton, Inc., *Pipestone County,* Havre, 158 bls. rags; E. J. Keller Co. Inc., *Pipestone County,* ———, 1809 bls. rags; Castle & Overton, Inc., *Pipestone County,* St. Nazaire, 607 bls. rags; G. W. Millar & Co. Inc., *Pipestone County,* St. Nazaire, 183 bls. rags; J. T. Flannery, *Pipestone County,* St. Nazaire, 142 bls. rags; American British Chemical Supplies, *Pipestone County,* Bordeaux, 334 bags casein; Castle & Overton, Inc., *Pipestone County,* Bordeaux, 653 bls. rags; J. T. Flannery, *Pipestone County,* Bordeaux, 218 bls. rags; J. H. Weill Co., *Liberty,* London, 2 cs. paper; G. A. Henshaw & Son, *Liberty,* Hull, 74 coils old rope; ———, *Liberty,* Hamburg, 19 bls. rags; E. W. Twitchell Co., *Liberty,* Hamburg, 840 rolls, 139 bls. wrapping paper; ———, *Liberty,* Leith, 49 bls. rags; ———, *Liberty,* Dundee, 29 bls. paper stock; Royal Manfg. Co., *Montreal Maru,* Shanghai, 50 bls. cotton waste; Chase National Bank, *Montreal Maru,* Kobe, 334 bls. rags.

BALTIMORE IMPORTS

WEEK ENDING MAY 2, 1936

———, *Lucia C.,* Trieste, 3586 bls. wood pulp; ———, *Kinai Maru,* Kobe, 193 bls. rags; Congoleum Nairn Co., *Examiner,* Marseilles, 367 bls. rags; Congoleum Nairn Co., *Pipestone County,* Havre, 1149 bls. rags; Congoleum Nairn Co., *Pipestone County,* St. Nazaire, 663 bls. rags; Congoleum Nairn Co., *Pipestone County,* Bordeaux, 342 bls. rags; National City Bank, *Liberty,* Leith, 164 bls. rags; Philadelphia National Bank, *Montreal Maru,* Kobe, 150 bls. rags; Gottesman & Co. Inc., *America,* Norway, 750 bls. wood pulp.

NORFOLK IMPORTS

WEEK ENDING MAY 2, 1936

Gottesman & Co. Inc., *Lucia C.,* Czecho-Slovakia, 1004 bls. wood pulp; Irving Trust Co., *Pipestone County,* Havre, 220 bls. bagging; N. Y. Trust Co., *Pipestone County,* Havre, 170 bls. bagging.

NEW ORLEANS IMPORTS

WEEK ENDING MAY 2, 1936

———, *Montreal Maru,* Kobe, 1053 bls. bagging; Gottesman & Co. Inc., *Rydboholm,* Finland, 600 bls. wood pulp; Parsons & Whittemore, Inc., *Wasgenwald,* ———, 882 bls. wood pulp.

GALVESTON IMPORTS

WEEK ENDING MAY 2, 1936

Burka Bagging Co., *Montreal Maru,* Kobe, 400 bls. bagging.

HOUSTON IMPORTS

WEEK ENDING MAY 2, 1936

———, *Montreal Maru,* Kobe, 173 bls. bagging.

MONTREAL IMPORTS

WEEK ENDING MAY 2, 1936

Gottesman & Co. Inc., *Beaverhill,* Czecho-Slovakia, 532 bls. wood pulp.

Bathurst Election Postponed

At the annual meeting of the Bathurst Power and Paper Company, held here, the election of directors was deferred for thirty days. In making the announcement the chairman, Brig.-General J. B. White, president of the company, stated that this action was taken at the request of a number of shareholders. The meeting was consequently adjourned to May 26, at 2 o'clock in the afternoon.

Prior to the adjournment the financial statement for 1935 and the accompanying directors' report, as well as a routine resolution approving the acts of the directors during the past year, were unanimously adopted.

New York Market Review

Office of the PAPER TRADE JOURNAL,
Wednesday, May 6, 1936.

Trading in the local paper market during the past week was moderately active. Demand for the various standard grades of paper was routine. Sales forces of the leading paper organizations, however, are generally confident regarding the future trend of the industry. Prices are steady to firm, in most instances.

The position of the newsprint industry continues to improve. Advertisers are reported to be steadily enlarging their budgets and circulations of the leading newspapers are rising. Production is being maintained in sufficient volume to take care of current requirements. The price situation is unchanged.

Demand for the various grades of fine paper is fairly persistent. Prices are generally holding to formerly quoted levels. No radical changes transpired in the tissue market. The coarse paper division is showing signs of improvement and quotations on kraft wrapping paper are firmer. Sentiment of the kraft wrapping paper section is improving.

Mechanical Pulp

The ground wood pulp market is practically unchanged. Manufacturing operations in the United States, Canada and abroad are keyed to consumption, as far as possible. Supplies of mechanical pulp are moving into consumption in good volume for the time of year. No further price changes have been reported of late.

Chemical Pulp

Steadiness prevails in the chemical pulp market. Offerings of bleached sulphite and kraft pulps are scarce and quotations firm. Bleachable grades of unbleached sulphite are arousing more paper mill interest. Bleached soda pulp is holding up well. Inquiries for both domestic and imported grades of chemical pulp for future delivery, are fairly numerous.

Old Rope and Bagging

The old rope market is exhibiting a strong undertone. prices on both domestic and imported old manila rope are firmer. Mixed strings are moving in good volume. The bagging market is rather quiet. Demand for scrap and gunny bagging is light. Roofing bagging, however, is in seasonal request. Roofing prices generally remain unchanged.

Rags

Sentiment in the domestic rag market is fairly optimistic. New cotton rags are displaying strength. No. 1 white shirt cuttings are in good request both for home and export requirements. Demand for roofing grades is moderately active. No radical changes have transpired in the imported rag market. Quotations are fairly steady.

Waste Paper

The local paper stock market is rather dull at present. Board mill demand for the lower grades is listless and quotations are softer. The better grades of waste paper, however, are fairly steady, especially white envelope cuttings, and hard and soft white shavings. Book stock is comparatively quiet.

Twine

Conditions in the local twine market are fairly satisfactory. Demand for the different varieties is considered good for the time of year. The outlook for the future is promising, in the opinion of most observers. Prices are generally steady, despite severe competition for desirable orders.

Rag Content Paper Literature

The Rag Content Paper Manufacturers, a group of twenty-two paper mills which make rag content business papers, have just released new promotional advertising literature in their cooperative campaign.

A new mailing piece entitled, "The Magic Carpet of Modern Business is the Quality Letterhead" has just been mailed to 25,000 users and purchasers of printing and paper. This folder presents a dramatic idea in both illustration and copy and stresses the importance of high quality paper for business correspondence. The mailing is 8½ x 11 inches in size, French Fold style and is printed by letterpress in two colors on 100 per cent rag paper.

Another advertising piece in the form of an eight-page tabloid newspaper is on the press and will shortly be mailed to printers throughout the country. This publication, called "Better Times" presents new and timely information regarding rag content papers and the part they play in helping to raise the quality standards of printing and stationery. It includes comments and selling ideas from leading printers as well as illustrations, cartoons and other interesting features.

Supplemental booklets, bulletins and letters are being mailed to fine paper merchants and others in the paper and printing industry.

Butler American in Rockefeller Center

The Butler American Paper Company Inc., the fifth large paper house to lease space in Rockefeller Center, and one of the largest paper merchandisers in the country, has taken new quarters on the 41st floor of the RCA Building for occupancy after the first of May. The lease was negotiated by Cushman & Wakefield.

Home offices of the company are in Chicago. The New York branch office has occupied quarters at 461 Eighth avenue for four years.

The other large paper companies now tenants in Rockefeller Center are: the Northwest Paper Company; Castle & Overton, Inc.; Gilman Paper Company, and Perkins-Goodwin Company.

Miscellaneous Markets

Office of the PAPER TRADE JOURNAL,
Wednesday, May 6, 1936.

BLANC FIXE.—Conditions in the blanc fixe market are fairly satisfactory. Prices are generally holding to schedule. The pulp is quoted at $42.50 to $45 per ton, in bulk; while the powder is selling at 3½ to 3¾ cents per pound, in barrels, at works.

BLEACHING POWDER.—The position of the bleaching powder market is practically unchanged. Shipments against contract are moving regularly. The price situation continues steady. Bleaching powder is quoted at $2 to $2.25 per 100 pounds, in drums, at works.

CASEIN.—The casein market is spotty. Domestic standard ground is quoted at 14½ and finely ground at 15; while Argentine and French standard ground are selling at 14 and finely ground at 14¼ cents per pound, all in bags, car lot quantities.

CAUSTIC SODA.—Steadiness prevails in the caustic soda market. The contract movement is normal. Prices remain unchanged. Solid caustic soda is quoted at $2.55 to $2.60; while the flake and ground are selling at $2.95 to $3 per 100 pounds, in drums, at works.

CHINA CLAY.—The china clay market continues to display strength. Contract shipments are moving freely. Prices are steady. Imported china clay is quoted at $13.50 to $21 per ton, ship side; while domestic paper making clay is selling at $6.50 to $12 per ton, at works.

CHLORINE.—Paper mill demand for chlorine is persistent. The contract movement is well up to average for the season. Prices are holding to formerly quoted levels, without difficulty. Chlorine is selling at $2.15 to $2.25 per 100 pounds, in tank cars, at works.

ROSIN.—The rosin market is easier. Paper making gum rosin is now quoted at $4.25 and wood rosin at $4.20 per 280 pounds, gross weight, in barrels, at Savannah. Seventy per cent rosin size is selling at $2.52½ per 100 pounds, in tank cars, at works.

SALT CAKE.—Business in the sale cake market is brisk. Contract shipments are moving in good volume. Prices are firm. Salt cake is quoted at $12 to $13; chrome salt cake at $11 to $12 per ton, at works. Imported salt cake is selling at $12 to $13 per ton, at mine.

SODA ASH.—The soda ash market is fairly active. The movement of supplies into consumption is steady. Prices are holding to schedule. Quotations on soda ash, in car lots, at works, per 100 pounds, are as follows: in bulk, $1.05; in bags, $1.20; and in barrels, $1.50.

STARCH.—Most of the business transacted in the starch market during the past week was routine. The contract movement is seasonal. Prices are steady. Special paper making starch is quoted at $3.20 per 100 pounds, in bags; and at $3.47 per 100 pounds, in barrels, at works.

SULPHATE OF ALUMINA.—Demand for sulphate of alumina is excellent for the time of year. Contract shipments are moving regularly. Prices remain unchanged. Commercial grades are quoted at $1.35 to $1.60; and iron free at $2 to $2.25 per 100 pounds, in bags, at works.

SULPHUR.—The sulphur market is steady. Yearly contracts are quoted at $18 per ton, in bulk, on orders of 1,000 tons, or over, and $20 on smaller quantities. On spot and nearby carloads the quotation is $21 per ton. All quotations are in car lots, at works.

TALC.—Paper mill demand for talc is moderately active. Shipments against contract are moving with fair regularity. Prices remain unchanged. Domestic talc is quoted at $16 to $18 per ton, at eastern mines; while imported talc is selling at $23 to $30 per ton, on dock.

Market Quotations

Paper

Rag Content Bond & Ledgers—Delivered Zone 1

	Bonds	Ledgers
100% Rag Ext. No. 1	.36	.37
100% Rag	.28	.29
75% Rag	.21	.22
65% Rag	.18	.19
50% Rag	.15	.16
25% Rag	.12½	.13½

Sulphite Bond & Ledgers—Delivered Zone 1

	Bonds	Ledgers
No. 1 Sulphite	7.75	8.75
No. 2 Sulphite	6.75	7.75
No. 3 Sulphite	6.00	7.00
No. 4 Sulphite	5.50	6.50

Book, Cased—			
S. & S. C.	5.35	@	5.75
S. & S. C. Litho.	5.60	@	6.00
M. F.	5.10	@	5.50
Coated and Enamel	5.90	@	6.55
Coated Litho	5.90	@	6.55
Tissues—Per Ream—			
White No. 1	.82½	@	—
White No. 1 M. G.	.77½	@	—
White No. 1½	.62½	@	—
White No. 2	.60	@	—
Anti-Tarnish M. G.	.67½	@	—
Colored	.80	@	—
Kraft	.67½	@	—
Manila	.60	@	—
Unbleached Toilet	2.60	@	3.30
Bleached Toilet	3.94	@	5.26
Paper Towels—			
Unbleached	2.10	@	3.35
Bleached	3.30	@	3.70
Manila—			
No. 1 Jute	9.00	@	9.25
No. 2 Jute	7.75	@	8.50
No. 1 Wood	4.00	@	5.25
No. 2 Wood	3.50	@	4.00
Fibre Papers—			
No. 1 Fibre	4.25	@	5.50
No. 2 Fibre	4.00	@	4.75

(Delivered New York)

News, per ton—			
Roll, contract	41.00	@	—
Sheets	46.00	@	—
Kraft—			
No. 1 Northern	4.25	@	4.75
Standard	4.12½	@	—
Southern	4.00	@	—
Boards—per ton—			
News	32.50	@	35.00
Chip	32.50	@	35.00
Sgl. Mla. Ll. Chip	45.00	@	47.50
Jute Lined Chip	42.50	@	45.00
Kraft Liners	60.00	@	62.50
White Pat. Coated	55.00	@	57.50
Binders Boards	67.00	@	75.00

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—		
Moist	23.00	@24.00
Dry	23.00	@24.00
(Delivered)		
No 1 Domestic and Canadian	27.00	@28.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—			
Division 1	2.60	@	2.90
Division 2	2.55	@	—*
Division 3	2.50	@	—*
Prime Qualities—			
Class 1. All Prime Easy Bleaching	2.05	@	—*
Other Than Easy Bleaching—			
Class 2. Higher than Standard	2.00	@	—*
Class 3, Standard	1.95	@	—*
Class 4, Lower than Standard	1.90	@	—*
(On Dock. Atlantic Ports)			
Kraft No. 1	1.85	@	2.00
Kraft No. 2	1.70	@	1.80
(F. o. b. Pulp Mill)			
Kraft Domestic	1.80	@	1.90
(Delivered)			
Soda Bleached	2.60	@	—

* Add 60 Cents per short ton, dock charges, for Albany; $2.00 for Lake Ports East and $3.00 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	8.00	@	8.15
Silesias No. 1	5.50	@	5.75
New Unbleached	8.25	@	8.50
New Soft Blacks	3.75	@	4.00
Blue Overall	5.75	@	6.00
Fancy	3.25	@	3.50
Washables	2.25	@	2.50
Mixed Khaki Cuttings	3.50	@	3.75
O. D. Khaki Cuttings	4.25	@	4.50
Men's Corduroy	2.00	@	2.25
New Mixed Blacks	2.75	@	3.00

Old Rags

White, No. 1—			
Repacked	3.00	@	3.50
Miscellaneous	2.75	@	3.25
White, No. 2—			
Repacked	1.75	@	2.25
Miscellaneous	1.50	@	1.75
Thirds and Blues—			
Repacked	2.25	@	2.50
Miscellaneous	2.10	@	2.20
Roofing Rags—			
No. 1	2.00	@	2.10
No. 2	1.70	@	1.80
No. 3 (bagging)	1.60	@	1.70
No. 4	1.60	@	1.70
No. 5A	1.00	@	1.10

Foreign Rags

New Rags

New Dark Cuttings	2.25	@	2.50
New Mixed Cuttings	2.00	@	2.25
New Light Silesias	4.50	@	5.00
Light Flannelettes	4.50	@	5.00
New White Cuttings	7.00	@	7.50
New Light Oxfords	4.00	@	4.50
New Light Prints	3.00	@	3.25

Old Rags

No. 1 White Linens	7.50	@	8.00
No. 2 White Linens	6.50	@	7.00
No. 3 White Linens	4.50	@	5.00
No. 4 White Linens	2.25	@	2.50
No. 1 White Cotton	4.25	@	4.75
No. 2 White Cotton	3.25	@	3.75
No. 3 White Cotton	2.50	@	2.75
No. 4 White Cotton	1.90	@	2.15
Extra Light Prints	2.00	@	2.25
Ord. Light Prints	1.75	@	1.85
Med. Light Prints	1.55	@	1.65
Dutch Blue Cottons	2.25	@	2.50
French Blue Linens	3.50	@	4.00
German Blue Linens	2.50	@	2.75
German Blue Cottons	2.00	@	2.25
Checks and Blues	2.00	@	2.25
Linsey Garments	2.50	@	2.60
Dark Cottons	2.00	@	2.35
Old Shopperies	1.75	@	2.00
New Shopperies	1.75	@	2.00
French Blues	2.25	@	2.50

Old Rope and Bagging

(Prices to Mill f. o. b. N. Y.)

Gunny No. 1—			
Foreign	2.20	@	2.25
Domestic	2.25	@	2.35
Wool Tares, light	1.75	@	2.00
Wool Tares, heavy	2.25	@	2.35
Bright Bagging	1.75	@	1.80
Manila Rope—			
Foreign	2.60	@	2.70
Domestic	2.50	@	2.60
Mixed Strings	1.10	@	1.15
New Burlap Cut	4.00	@	4.25
Hessian Jute Threads—			
Foreign	2.60	@	2.75
Domestic	2.80	@	3.00

Old Waste Papers

(F. o. b. New York)

Shavings—			
White Envelope Cuttings	2.55	@	2.65
Ordinary Hard White No. 1	2.25	@	2.35
Hard White No. 2	2.10	@	2.20
Soft White No. 1	2.05	@	2.15
Flat Stock—			
Stitchless	.65	@	.75
Over issue Mag	.65	@	.75
Solid Flat Book	.55	@	.60
Crumpled No. 1	.35	@	.40
Solid Book Ledger	1.50	@	1.65
Ledger Stock	.85	@	.90
New B. B. Chips	.30	@	.35
Manilas—			
New Env. Cut	1.75	@	1.85
New Cuttings	1.35	@	1.45
Bogus Wrapper	.40	@	.50
Old Kraft Machine—Compressed bales	1.25	@	1.35
News—			
No. 1 White News	1.30	@	1.40
Strictly Overissue	.50	@	.60
Strictly Folded	.32½	@	.37½
No. 1 Mixed Paper	.20	@	.25

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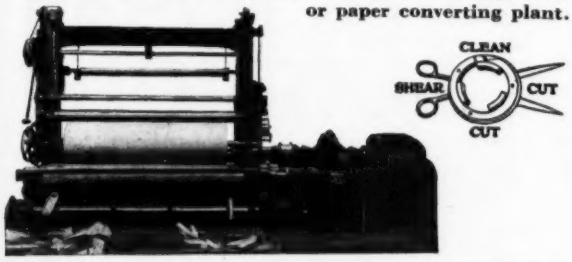

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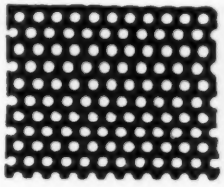
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Twines

(F. o. b. Mill)

(Soft Fibre)

Coarse Polished—			
India	.13¼	@	.15¾
Belg. White Hemp	.14¼	@	.17¾
India Compress	.13¾	@	.14¼
Fine Polished—			
Fine India	.21½	@	.23½
Special	.19½	@	.21½
Unpolished—			
Box	.12	@	.12½
Paper Makers	.09	@	.13¼
Tube Rope	.10	@	.15½
Wall Paper	.11	@	.14½
Wrapping	.15½	@	.21
Special	.15	@	.15½
Soft Fiber Rope	.12½	@	.12¾

(Hard Fibre)

Bond	.12	@	.20½
Anchor	.11½	@	.13
Manila	.21	@	.2[illegible]

CHICAGO

Paper

(F. o. b. Mill)

Rag Bond	.12	@	.40
Water Marked Sulphite Bond	.06¾	@	.11
Sulphite Bond	.05½	@	.07¼
Superfine Writing	.18	@	.24
No. 1 M. F. Book	.06½	@	.07¾
No. 2 M. F. Book	.05¼	@	.06¾
No. 1 S.&S.C. Book	.06¾	@	.07¾
No. 2 S.&S.C. Book	.05¼	@	.06½
Coated Book	.07	@	.12
Coated Label	.07	@	.08½
No. 1 Manila	.04¼	@	.05¾
No. 1 Fibre	.04¾	@	.05¼
No. 2 Manila	.04¼	@	.04¾
Butcher's Manila	.03¼	@	.03¾
No. 1 Kraft	4.75	@	5.00
Southern Kraft	3.88	@	4.25
No. 2 Kraft	3.88	@	4.25
Wood Tag Boards	.04¼	@	.06¼
Sulphite Screenings	.03	@	.03¼
Manila Tissue	.05¾	@	.07
White Tissue	.07	@	.09

(Delivered Central Territory)

News, per ton—			
Rolls, contract	42.00	@	—
Sheets, open	47.00	@	—
Boards, per ton—			
Plain Chip	46.50	@	—
Solid News	50.00	@	—
Manila Lined Chip	55.00	@	—
Patent Coated	65.00	@	—
Container Lined—			
85 Test, per 1000 sq. ft.			1.70
100 Test, per 1000 sq. ft.			1.85

Old Papers

(F. o. b. Chicago)

Shavings—			
No. 1 White Envelope Cuttings	1.70	@	2.00
No. 1 Hard White	1.40	@	1.65
No. 1 Soft White	1.25	@	1.50
Ledger & Writings	.60	@	.70
Solid Books	.50	@	.60
Blanks	1.00	@	1.05
Krafts	.80	@	.90
New Kraft Cuts	1.20	@	1.30
Manila Env. Cuts	1.25	@	1.30
Ex. No. 1 Manila	.90	@	1.00
Print Manila	.40	@	.50
Overissue News	.40	@	.45
Old Newspapers—			
No. 1	.30	@	.35
No. 1 Mixed Paper	.25	@	.30
Roofing Stocks—			
No. 1	30.00	@	—
No. 2	28.00	@	—

PHILADELPHIA

Paper

Rag Content Bond & Ledgers—
Delivered Zone 1

	Bonds	Ledgers
100% Rag Ext. No. 1	.36	.37
100% Rag	.28	.29
75% Rag	.21	.22
65% Rag	.18	.19
50% Rag	.15	.16
25% Rag	.12½	.13½

Sulphite Bond & Ledgers—
Delivered Zone 1

	Bonds	Ledgers
No. 1 Sulphite	7.75	8.75
No. 2 Sulphite	6.75	7.75
No. 3 Sulphite	6.00	7.00
No. 4 Sulphite	5.50	6.50

F.o.b. Mill

Book, M. F.	5.00	@	—
Book, S. S. & C.	5.25	@	—
Book, Coated	6.15	@	—
Coated Lithograph	6.15	@	—
No. 1 Jute Manila	10.50	@	—
Manila Sul., No. 1	6.75	@	—
Manila No. 2	4.25	@	—
No. 1 Kraft	6.00	@	—
Southern Kraft	5.00	@	—
News Print Rolls	40.00	@	—
Straw Board	40.00	@	45.00
News Board	40.00	@	—
Chip Board	37.50	@	—
Wood Pulp Board	70.00	@	85.00
Binder Boards—			
No. 1, per ton	75.00	@	80.00
No. 2, per ton	70.00	@	75.00
Carload lots	65.00	@	70.00
Tarred Felts—			
Regular	52.25	@	54.25
Slaters (per roll)	.84	@	.94

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White, No. 1	.09	@	.09½
New White, No. 2	.05½	@	.06
Light Silesias	.05½	@	.06½
Silesias, No. 1	.04½	@	.05
Black Silesias, soft	.03½	@	.04
New Unbleached	.06½	@	—
Washable, No. 1	.02	@	.02½
Blue Overall	.06	@	.06½
Cottons—According to grades—			
Washable, No. 2	.02½	@	.04½
New Blue	.02	@	.02½
Fancy	.03	@	—
New Black Soft	.04¼	@	.04¾
New Light Seconds	.04	@	.04¼
New Dark Seconds	2.80	@	—
Khaki Cuttings—			
No. 1 O. D.	.04½	@	.05
No. 2 Mixed	.03½	@	.04½
Corduroy	.02¼	@	.02½
New Canvas	.04½	@	.05
New Black Mixed	.02¼	@	.02½

Domestic Rags (Old)

White No. 1—			
Repacked	4.00	@	4.50
Miscellaneous	3.00	@	3.50
Thirds and Blues—			
Miscellaneous	2.00	@	2.25
Repacked	2.50	@	2.75
Black Stockings (Export)	4.50	@	5.00
Roofing Stock—			
Foreign No. 1	2.20	@	2.25
Domestic No. 1	1.80	@	1.85
Domestic No. 2	1.60	@	1.65
Roofing bagging	1.45	@	—

Bagging

(F. o. b. Phila.)

Gunny, No. 1—			
Foreign	2.00	@	—
Domestic	2.25	@	—
Manila Rope	2.25	@	2.50
Sisal Rope	2.00	@	2.25
Mixed Rope	1.00	@	1.10
Scrap Burlaps—			
No. 1	2.00	@	2.50
No. 2	.90	@	1.00
Wool Tares, heavy	3.00	@	3.25
Mixed Strings	1.00	@	1.10
No. 1 New Light Burlap	3.00	@	3.50
New Burlap Cuttings	2.50	@	2.75

Old Papers

(F. o. b. Phila.)

Shavings—			
No. 1 Hard White	2.30	@	2.40
No. 2 Hard White	2.10	@	2.20
No. 1 Soft White	1.80	@	1.85
No. 2 Soft White	1.40	@	1.45
No. 1 Mixed	—	@	.85
Solid Ledger Stock	1.50	@	1.60
Ledger Stock, white	1.15	@	1.20
Ledger Stock, colored	.85	@	.90
No. 1 Books, heavy	.65	@	.70
Manila Cuttings	1.50	@	1.60
Print Manila	.50	@	.60
Container Manila	.50	@	.60
Kraft Paper	1.10	@	1.20
No. 1 Mixed Paper	.35	@	.40
Straw Board Chip	.40	@	—
Binders Board Chip	.40	@	—
Corrugated Board	.60	@	.65
Overissue News	.60	@	—
Old Newspapers	.40	@	—

BOSTON

Paper

Rag Content Bond & Ledgers—
Delivered Zone 1

	Bonds	Ledgers
100% Rag Ext. No. 1	.36	.37
100% Rag	.28	.29
75% Rag	.21	.22
65% Rag	.18	.19
50% Rag	.15	.16
25% Rag	.12½	.13½

Sulphite Bond & Ledgers—
Delivered Zone 1

	Bonds	Ledgers
No. 1 Sulphite	7.75	8.75
No. 2 Sulphite	6.75	7.75
No. 3 Sulphite	6.00	7.00
No. 4 Sulphite	5.50	6.50

F.o.b. Mill

Book, Super	.06	@	.09
Book, M. F.	.05½	@	.08½
Book, Coated	.08½	@	.18
Coated Litho	.09	@	.12
Jute Manila No. 1	.11	@	.13
Manila, Sul. No. 1	.04¾	@	.06½
Manila, Sul. No. 2	.03¾	@	.04½
No. 1 Kraft	.04¼	@	—
No. 2 Kraft	.04½	@	—

(Delivered New England points)

Southern Kraft	.04	@	—
News Print Rolls	39.50	@	—
Straw Board, rolls	.009	@	35.00
Filled News Board	40.00	@	45.00
Chip Board	37.50	@	40.00
Single Manila Lined Chip	47.50	@	52.50
Single White, Patent Coated News Board (Bender)	55.00	@	65.00
Wood Pulp Board	70.00	@	75.00
Binder Boards (Standard Grade)	67.00	@	75.00

Old Papers

(F. o. b. Boston)

Shavings—			
No. 1 Hard White	2.00	@	2.20
No. 1 Soft White	1.75	@	1.90
No. 2 Mixed	.75	@	.80
Solid Ledger Books	1.50	@	1.75
Overissue Ledger Stock	1.15	@	1.30
Mixed Ledgers	.85	@	.90
No. 1 Books, heavy	.60	@	.70
No 1 Books, light	.50	@	.60
Crumpled Stitchless Book Stock	.50	@	.60
Manila Env. Cuttings	1.50	@	1.60
No. 1 Old Manila	.60	@	.65
White Blank News	1.20	@	1.25
No. 1 Kraft	1.15	@	1.20
Mixed Papers	.20	@	.25
Print Manila	.47½	@	.50
Container Manilas	.27½	@	—
Old Newspapers	.25	@	.30
Overissue News	—	@	.40
Box Board Chips	—	@	.25
Corrugated Boxes	.37½	@	.42½
Kraft corrugated boxes	.95	@	1.00
Screening Wrappers	.40	@	.45

Bagging

(F. o. b. Boston)

Manila Rope—			
Foreign	2.35	@	2.45
Domestic	2.35	@	2.45
Transmission Rope	1.30	@	1.40
Jute Rope	2.00	@	2.25
Jute Carpet Threads	1.00	@	1.10
Gunny No. 1—			
Foreign	2.00	@	2.10
Domestic	1.85	@	1.95
Bleachery Burlap	4.50	@	5.00
Scrap Burlap—			
Foreign	2.10	@	2.15
Domestic	1.75	@	1.90
Scrap Sisal	2.00	@	2.25
Scrap Sisal for Shredding	2.25	@	2.50
Wool Tares, heavy	2.25	@	2.35
New Burlap Cuttings	2.25	@	2.35
Australian Wool Pouches	2.30	@	2.60
Heavy Baling Bagging	1.85	@	1.95
Paper Mill Bagging	1.75	@	2.00
Bagging No. 2	1.25	@	1.50

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.01¾	@	.02
New White No. 1	.07¾	@	.08
New White No. 2	.04	@	.04¼
Silesias No. 1	.05½	@	.06
New Black Silesias	.03½	@	.04¼
Soft Unbleached	.07¼	@	.07¾
Blue Cheviot	5.50	@	6.00
Fancy	.02½	@	.02¾
Washable	.0165	@	.017
Cottons—According to grades—			
Blue Overalls	5.50	@	6.00
New Black, soft	.04	@	.04¼
Khaki Cuttings	.04	@	.04¼
O. D. Khaki	.03¾	@	.04¼
Corduroy	.01¾	@	.02
New Canvas	—	@	.05
B.V.D. Cuttings	—	@	.06¼

Domestic Rags (Old)

(F. o. b. Boston)

Canvas	.04½	@	—
White No. 1—			
Repacked	—	@	2.75
Miscellaneous	2.50	@	2.75
White No. 2—			
Repacked	1.90	@	2.00
Miscellaneous	2.00	@	2.25
Twos and Blues	1.75	@	2.25
Thirds and Blues—			
Repacked	1.37½	@	1.75
Miscellaneous	1.25	@	1.62½
Black Stockings	3.90	@	4.00
Roofing Stock—			
No. 1	1.90	@	2.00
No. 2	1.60	@	1.70
No. 3	1.50	@	1.60

Foreign Rags

(F. o. b. Boston)

Dark Cottons	1.85	@	2.00
New White Shirt Cuttings	6.50	@	6.75
Dutch Blues	2.25	@	2.50
New Checks & Blues	2.50	@	3.00
Old Fustians	1.90	@	2.00
Old Linsey Garments	2.10	@	2.25
New Silesias	4.75	@	5.25

TORONTO

Paper

(F. o. b. Mill)

Bond—			
No. 1 Sulphite	.11	@	—
No. 2 Sulphite	.08½	@	—
No. 1 Colored	.12	@	—
No. 2 Colored	.09	@	—
Ledgers			
Ledgers, No. 1	.34½	@	—
Ledgers, No. 2	.25½	@	—
Writing	.09	@	.09½
Book—			
No. 1 M. F. (Carloads)	6.50	@	—
No. 2 M. F. (Carloads)	6.00	@	—
No. 3 M. F. (Carloads)	6.00	@	—
No. 1 S. C. (Carloads)	7.00	@	—
No. 2 S. C. (Carloads)	6.50	@	—
No. 3 S. C. (Carloads)	6.50	@	—
No. 1 Coated and Litho	12.00	@	—
No. 2 Coated and Litho	10.50	@	—
No. 3 Coated and Litho	9.50	@	—
Coated tinted	13.00	@	—
Wrapping—delivered—			
Rag Brown	4.75	@	—
White Wrap	3.50	@	—
"B" Manila	4.80	@	—
No. 1 Manila	5.40	@	—
Fiber	5.40	@	—
Kraft, M. F.	5.90	@	—
Kraft, No. 2	5.40	@	—

(F. o. b. Cars Toronto)

News, per ton—			
Rolls (contract)	40.50	@	—
Sheets	45.00	@	—

Pulp

Ground wood	27.00	@	—
Unbleached Sulphite	42.00	@	—
Book (Class 1)	58.00	@	—
Writing (Class 2)	59.00	@	—
Select (Class 3)	60.00	@	—

Old Waste Paper

(In carload lots, f. o. b. Toronto)

Shavings—			
White Env. Cut	2.00	@	2.25
Soft White	1.60	@	1.90
White Blk. News	1.25	@	1.40
Book and Ledger—			
Flat Magazine and Book Stock (old)	.90	@	1.00
Light and Crumpled Book Stock	.80	@	.90
Ledgers and Writings	1.00	@	1.05
Manilas—			
New Manila Cut	1.25	@	1.40
Printed Manilas	.50	@	—
Kraft	1.00	@	1.60
News and Scrap—			
Strictly Overissue	.55	@	—
Strictly Folded	.50	@	—
No. 1 Mixed Paper	.40	@	—

Domestic Rags

(Price to mills, f. o. b. Toronto)

No. 1 White Shirt Cuttings	.07½	@	.07¾
Fancy Shirt Cuttings	.02¾	@	.03

PAPER TRADE JOURNAL

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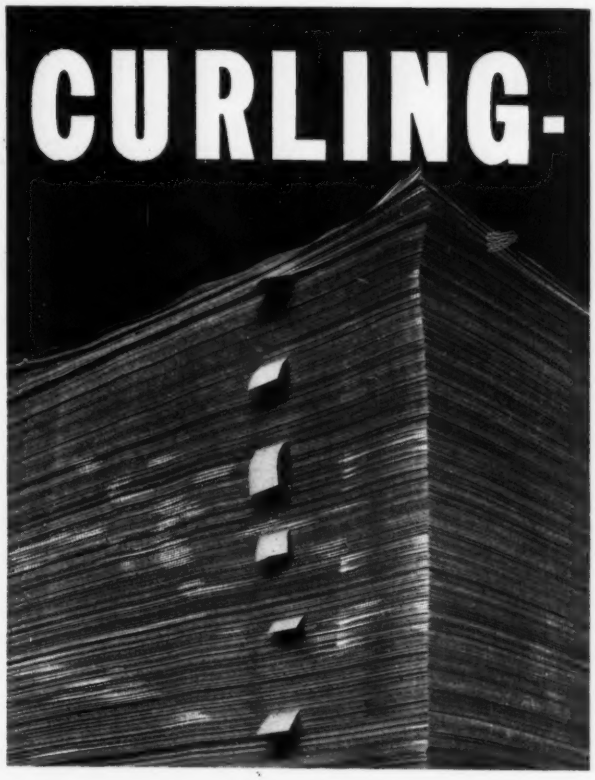

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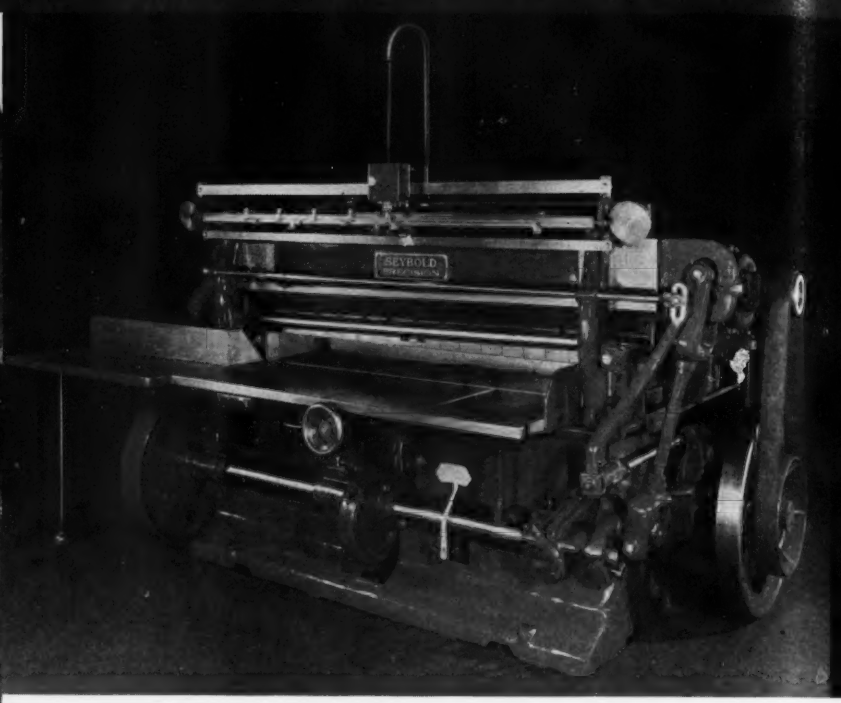

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